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VOL. VIII.—No. 12. MANILA AND SHANGHAI, MAY, 1912 25 cents, U. S. Cy.

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Mineral Resources of Aroroy, District of Masbate

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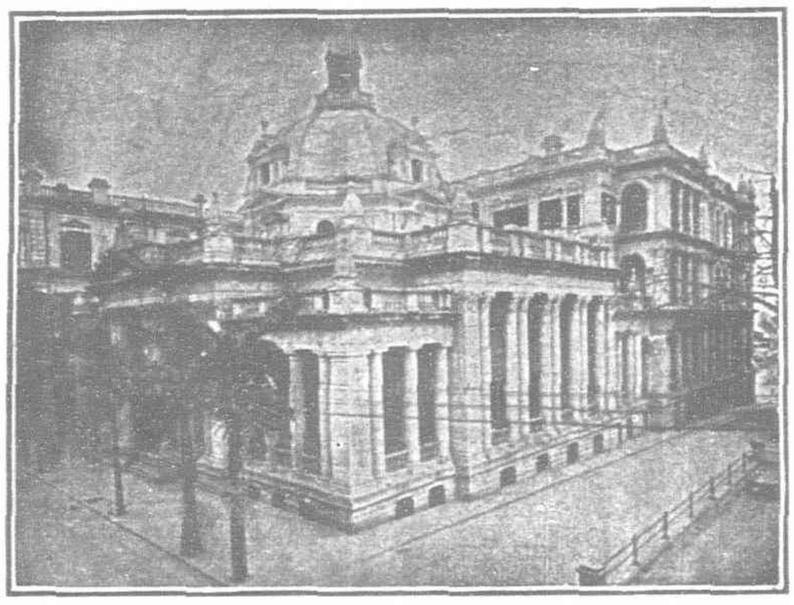

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THE FAR EASTERN REVIEW

COMMERCE • ENGINEERING • FINANCE

VOL. VIII. MANILA, P. I., SHANGHAI, AND YOKOHAMA, MAY, 1912 No. 12.

MINERAL RESOURCES OF AROROY DISTRICT, MASBATE

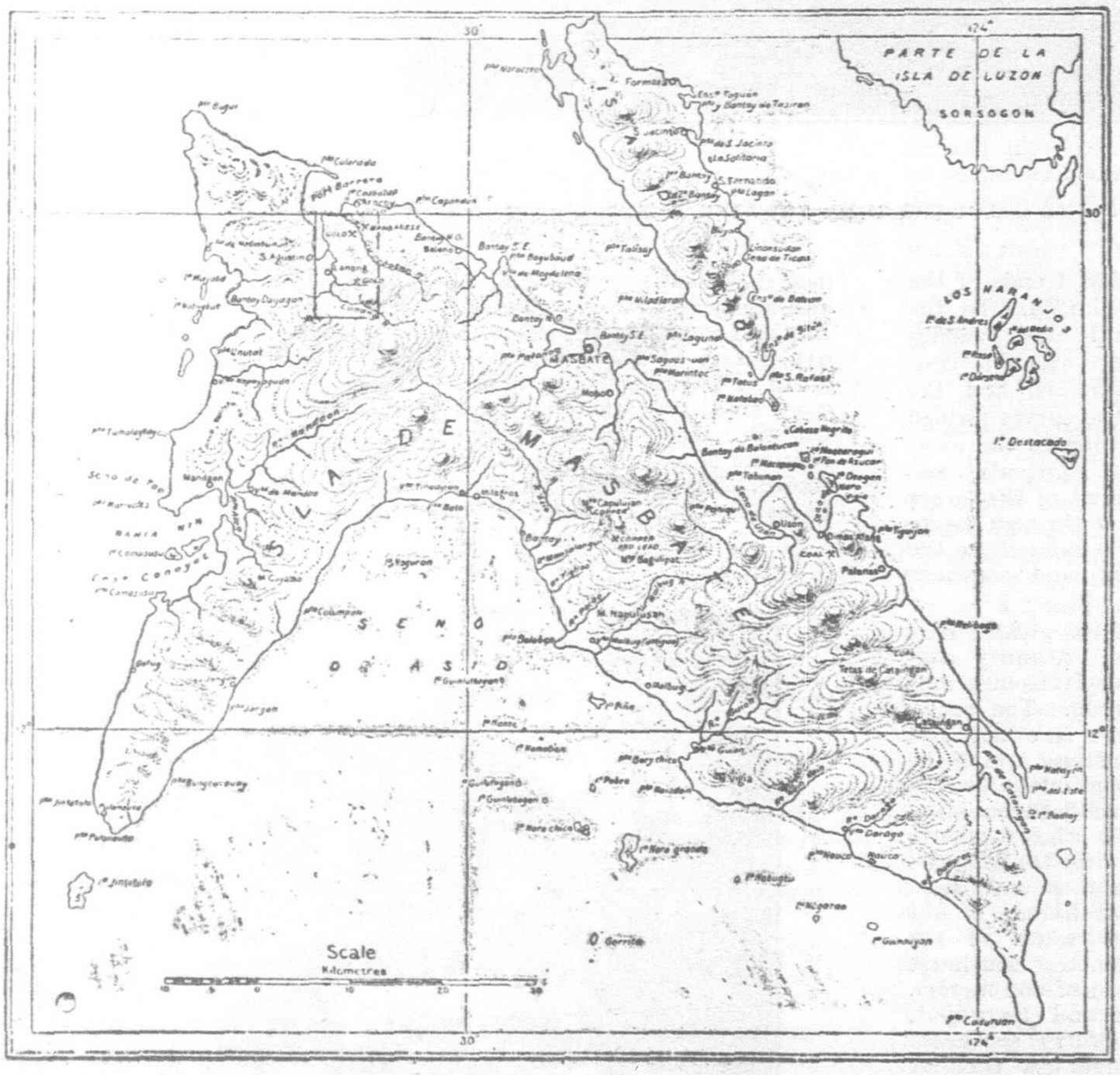
The successful operation of the Colorado Mining Company since last November has attracted unusual attention to the mineral deposits of the Aroroy District, Masbate. There has been also marked activity in development work on other properties of the district with the prospect of the installation of a number of plants.

A paper, prepared by Mr. Henry C. Ferguson of the Division of Mines on the "Geology and Mineral Resources of the Aroroy District, Masbate," appearing in the Philippine Journal of Science, is therefore of especial interest at this time. This paper reviews geological and topographical field work during 1907-08-09 carried on by Mr. Ferguson assisted by Mr. R. M. Clark, field assistant of the Division. The following excerpts from his paper are of special interest:

The rainfall on Masbate is well below the average for the Philippines (2,200 millimeters); observations at Port Palanog (Masbate) for the years 1904, 1905, and 1906 give an average annual rainfall of only 1,446 millimeters. The records show a smaller rainfall at only four out of the sixty-four stations in the Islands. The dry season extends from February to May, inclusive, only 17 per cent of the total precipitation occurring during these four months. Throughout the remainder of the year, the rainfall is distributed fairly evenly. Destructive typhoons visited the island in November, 1905, September, 1908, and December, 1908.

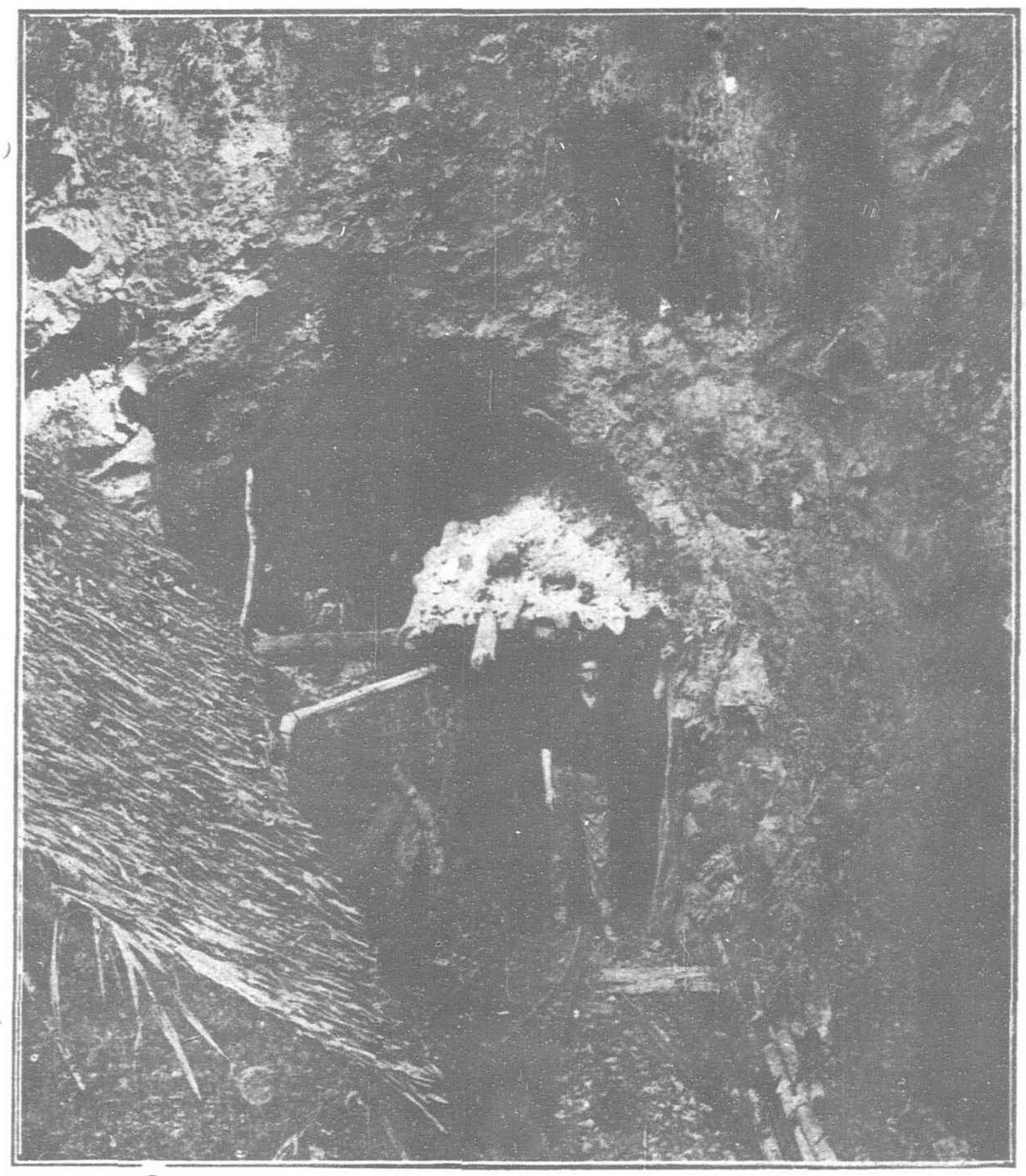
While there are no figures available for the precipitation in the Aroroy district, I believed that it is undoubtedly less than at the town of Masbate itself, as abacá (Manila hemp) can not profitably be grown at Aroroy, while a small amount is produced in the vicinity of Masbate and also farther southeast toward Kataingan. Even in the Aroroy district itself the rainfall is uneven, the majority of the showers during the rainy season passing through the southern part of the area to the South of Mount Kalakbao. The temperature records for the year 1909 show a very even temperature with a smaller range between the seasons than at Manila (28° C.)

Population.—The population of the island is given in the census of 1903 as 29,451, or about seven to the square kilometer. This is small compared with other islands of the Visayan group, and Masbate could easily support a much larger population. The people are for the greater part Visayans, and the language spoken is a dialect of Visayan. There is a scattering of Bicols and Tagalogs, especially along the northern coast. The people are peaceable, hospitable, and friendly, and although of course irresponsible and not very energetic they make as good workers as are to be found elsewhere in the Islands.



MAP OF MASBATE (FROM ATLAS DE FILIPINAS, CORRECTIONS BY H. G. FERGUSON)

Topography.—The Island of Masbate lies almost exactly in the center of the Philippine Archipelago, between latitudes 11° 43′ north and 12° 36′ north, and longitudes 123° 09′ east and 124° 05′ east, and has an area of approximately 4,000 square kilometers. It owes its unique, two-pronged shape to the junction



(Photo by H. G. Ferguson.)

UPPER LEVEL OF THE COLORADO MINE SHOWING BANDING OF THE ORE

of the two prevailing anticlinical trends of the Visayan Islands and central Luzon. To the inner series, as described by Becker, belongs the western arm of Masbate, which is continued in eastern Panay, Guimaras, and the Cagayanes, and is parallel to the curves formed by Palawan and the Culion group to the west, and the Negros, Zamboanga Peninsula, and Sulu line to the east. The trend of the larger arm of the island is continued through Leyte and eastern Mindanao and is parallel to the outer line formed by Samar and southern Luzon.

Masbate is mountainous and the greater part of the interior is unexplored. A fairly continuous range of hills rises steeply from a narrow plain on the western prong. The maximum elevation of this range is about 600 meters at Mount Gantal. The larger arm of the island is not a continuous range but is broken by two transverse valleys; one between Milagros and Port Palanog, and the other southerly from Uson Except for these two troughs, the country is extremely rugged and mountainous. The highest mountain of the island, Mount Simbahan, lies 11 kilometers south of the village of Baleno and 18 kilometers southeast of Aroroy, and has an elevation of 660 meters. Two high peaks, Capuluhan and Bagulipat, occur in the mountainous country southeast of the Milagros-Masbate trough. A peculiar feature of the topography of this part of the island is the course of the Malbug River, which rises near the northeastern coast and flows southeast parallel to the coast, until near Uson it makes a sharp turn at right angles to its former direction and flows southwest into the Gulf of Asid. The largest rivers of the island, the Asid and Malbug, drain into the shallow Gulf of Asid. The crests of the mountain ranges lie near the northern shore, there being a considerable stretch of plain and piedmont country on the southwestern side of the main prong of the island. Similarly, the greatest depths near the shore are to be found along the northern and northeastern coast, especially between Naro Bay and Point Bugui, where there is a depth of 911 meters at a point less than 3 kilometers north of Bagubau Point, while off the southern coast shoal water extends for a great distance. On the accompanying map the submarine contours of 50, 100, and 200 meters depth are shown. The excellent harbors of Port Barrera (Aroroy), Port Palanog (Masbate), Naro Bay (Dimas Alang), and Port Kataingan are situated on the northern and eastern coasts. On the west coast the only harbor is Port Mandaon. The Gulf of Asid, on the south coast, is so shallow that only small boats can call at Milagros.

Location and topography of the Aroroy District.—The Aroroy mining district is situated near the northwestern corner of the island in the group of hills to the east of Port Barrera, which is a deep bay extending southward for a distance of about 13 kilometers. Any one entering this bay must be struck by the extremely different topography exhibited on either side. To the westward are series of nearly horizontal sedimentaries, limestones, conglomerate, and shale. The limestone outcrops form a regular series of terraces which can be followed without a break for great distances. Toward the southern part of the bay erosion has broken these terraces into a number of small mesas. On the other hand, the country on the Aroroy side is more irregular and the hills present smooth rounded outlines without any trace of terracing.

Mount Vil-lon, lying just outside the area mapped, is the highest mountain in the district, having an elevation of about 400 meters. It differs from the other hills in having a northeasterly trend, and breaks off precipitously at Monument Rock, near the Guinobatan River. The majority of the mineral veins outcropping in the district are found in the three hills, Mounts Aroroy, Bagadilla, and Kalakbao. While the summits of these three hills lie in a north and south line, the individuals show a pronounced northwesterly trend, due to the superior resistance to erosion offered by the quartz veins. Mount Aroroy, or Kanatanatawan (elevation 255 meters), lies farthest to the north and is separated from the highest of the three hills, Mount Bagadilla (elevation 350 meters), by Bangon Creek, which here flows through a deep cañon. Mount Bagadilla, on its western side, sends out several northwesterly spurs marking the situation of different quartz veins. The gorge of the Guinobatan River separates Mount Bagadilla from the southern hill, Mount Kalakbao, which has an elevation of 220 meters.

A long stretch of irregular country broken by a series of small hills extends to the south and west from Mount Kalakbao until the Lanang River is reached. This river cuts a complicated channel through a range of hills of over 200 meters elevation, and follows a northwesterly course. Mount Cogran lies just to the northeast of this range, its height being due to the resistance of the quartz veins which outcrop here.

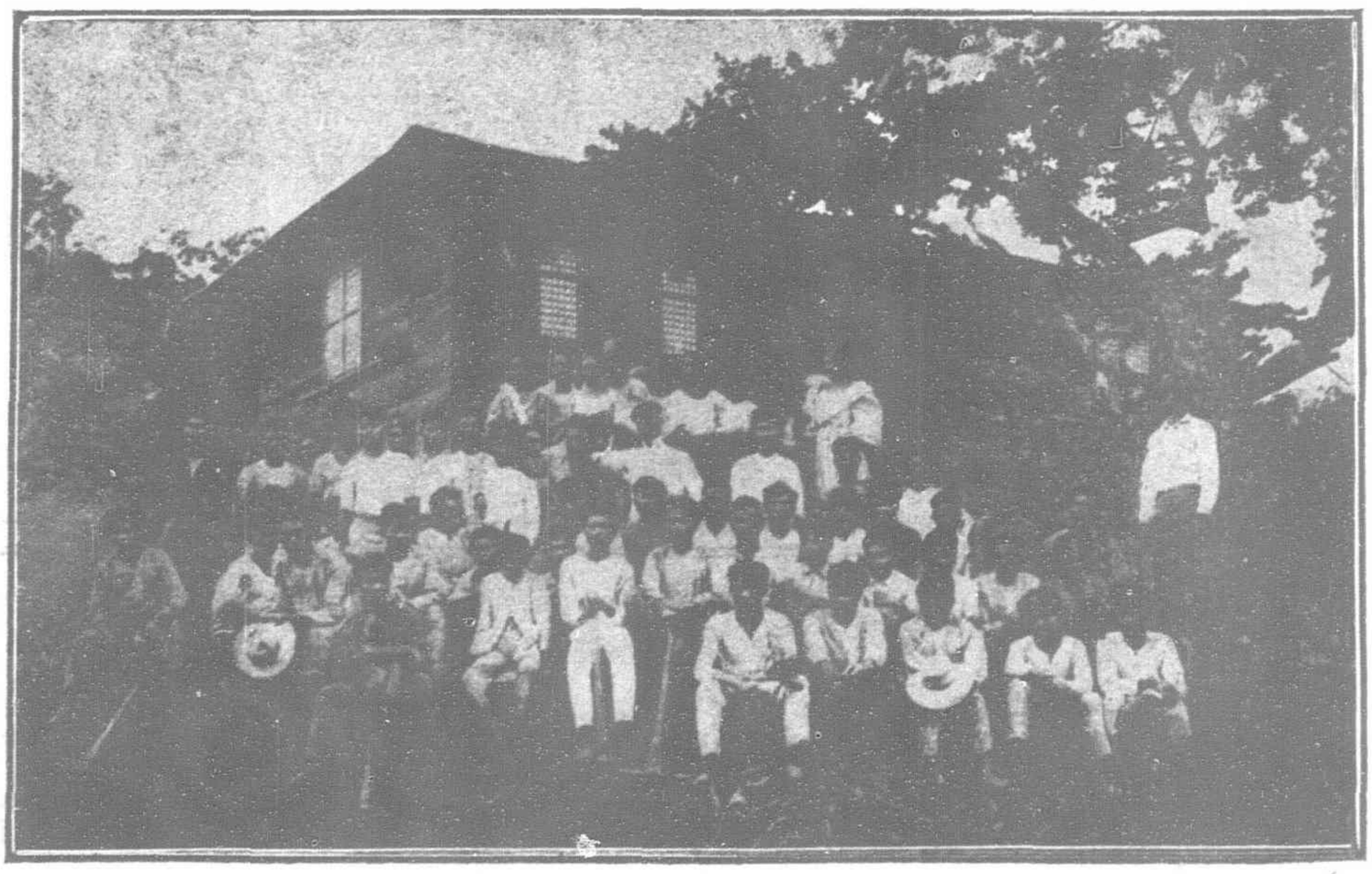


Photo by (H. G. Ferguson.)

GROUP OF NATIVE MINERS AT THE OFFICE OF THE SYNDICATE MINING CO.

The area is drained by several permanent streams, all of which (the Buyuan River lying outside the area proper) drain northwestward into Port Barrera. Three principal streams drain the area: The Guinobatan River, Panique Creek, and the Lanang River. The northern branch of the Guinobatan, Bangon Creek, flows in a deep gorge between Mount Aroroy and Mount Bagadilla; while its direction is northwesterly it does not follow the strike of the quartz veins, but cuts obliquely across them and joins the Guinobatan about one kilometer from its mouth. The Guinobatan rises near Mount Baha Simbahan and flows in a general northeasterly and northerly direction, partly encircling Mount Vil-lon. Its course between Mounts Kalakbao and Bagadilla is almost westerly; like the Bangon, it cuts obliquely across the vein system. Beyond the gorge the stream turns sharply to the north and for two kilometers flows parallel to the bay and about one kilometer distant from it. Panique Creek drains the greater part of the irregular area lying between Mount Kalakbao and the Lanang Range. The peculiarities of the course of the Lanang River have been discussed at length in my paper on the physiography of western Masbate. It, like the Guinobatan, rises on Mount Baha Simbahan, and where mapped in the Aroroy district presents a very peculiar course which seems to be the result of successive stream captures, for instead of flowing down the broad valley to the north of the Lanang range, which apparently was its earlier course, it twice cuts through the range in deep gorges. The Luya, a tributary of the Lanang, flows from the northern side of Mount Cogran and joins the main stream about two kilometers above the upper gorge.

APPROACH TO "HAVE GOT" TUNNEL AND CHUTE OF THE EASTERN MINE.

The southern shores of Port Barrera are lined with mangrove swamps, which have a very large development at the mouth of Lanang River, and at the head of the bay near the *barrio* of San Agustin.

Geology.—In the geologic map accompanying this paper, the rocks are divided into six formations as follows:

1. The *Kaal formation*, containing the oldest rocks in the district, chiefly slates, outcropping in the valley of Kaal Creek and in isolated patches to the northward.

2. The *Aroroy quartz diorite*, occupying the northern portion of the area and intrusive into the Kaal series. With this are mapped scattered outcrops of other deep-seated igneous rocks including diorite, gabbro, and syenite.

3. The *Panique volcanic series* which covers the greater part of the area. On the map this series has been subdivided roughly into the dominant andesitic types, the pyroclastic rocks, and local areas of sediments derived from the andesite and the more basic igneous rocks.

4. The *Mountain Maid limestone*, the single outcrop in this district of the blue limestone already referred to, is found on the Mountain Maid claim in the Guinobatan Valley.

5. The *Lanang formation* of conglomerate and sandstone forming the hills to the south of the Lanang River.

6. The *Port Barrera formation*, consisting of Miocene sediments, found only on the opposite side of Port Barrera.

Individual properties.—It is my purpose to give short notes on the properties which at the time of my last visit were furthest developed. The fact that many are omitted is no evidence that they may not be as fully worthy of consideration as their more developed neighbors, but in a region where work is progressing so rapidly as in the Aroroy district to-day, it would serve no good purpose to multiply descriptions which rapid development is rendering obsolete.

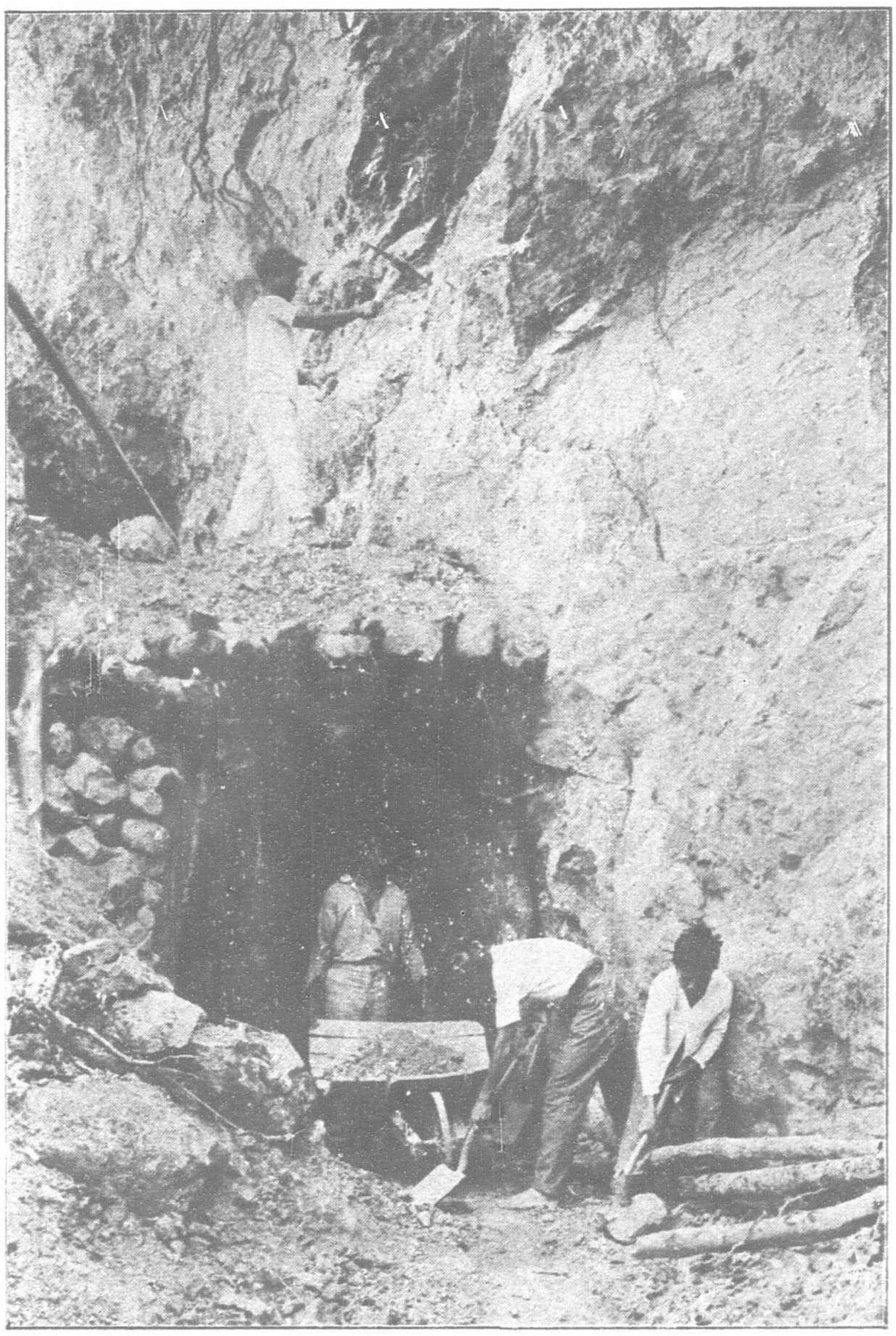
The Keystone Mining Company has developed one vein on Aroroy Mountain by means of two shafts 85 meters apart and connected by a drift at the 20-meter level sunk on the vein at the top of the hill. The deeper shaft now reaches a depth of 42 meters. The ore differs from the type commonly met with in that there is a far smaller amount of manganese present than in other veins of the district, and the characteristic banding observed elsewhere is lacking. The ore is a white quartz, stained red with iron oxide and to some extent honeycombed. The quartz is much shattered and shows subsequent mineralization in the shape of many small quartz stringers cutting the vein in all directions. The ore is oxidized throughout to the bottom of the shaft; however, the larger pieces of quartz often show cores of the characteristic bluish quartz carrying a considerable proportion of pyrite.

The Colorado Mining Company controls a group of claims on Mount Bagadilla. The veins outcrop on this property, the best developed of which is known as the "No. 5." This has been opened by drifts at elevations of 230 meters and 290 meters above sea-level, connected by an incline shaft in the footwall, and winzes sunk to a depth of 50 meters below the lower level. This vein, which is about 5 meters in width, shows the most beautifully marked banding of any in the district, particularly near the footwall. The values run rather irregularly, but a fairly well defined pay streak of about 2.5 meters width on the footwall side, although generally separated from the footwall by 0.5 meter or less of lower grade material carries the richest part of the ore. On the hanging wall side the decomposed andesite carries values for about 1 meter from the wall of the vein, these probably being contained in small quartz stringers which are found near the vein. A curious feature is that the vein makes a sharp turn toward the northeast at a considerable distance from the portal of the adit, its normal course being northwest. It follows this new direction for about 8 meters and then resumes its northwesterly course, apparently due to a pre-existing northeasterly fault.

Another vein on the Buena Suerte claim of the Colorado Company's property, to the southwest of "No. 4," shows ancient workings of considerable extent These are not in the vein itself, which is largely hard massive quartz, but in the decomposed andesite on the hanging wall where small rich stringers had been followed by the early miners in irregular stopes and passages.

The Montana vein now being prospected by the Aroroy Mining Company lies on a spur extending toward the northwest from Mount Bagadilla. This vein can be traced from the gorge of the Guinobatan River northwesterly for a distance of some 1,500 meters. It is narrower than the average for the district, varying from 1 to 3 meters in thickness, and, as it is nearer the water-level, the ore is less oxidized than in others. Banding is entirely lacking, the oxidized portions of the ore showing irregular honeycombing. Although rich ore has been discovered at various places and a line of ancient open cuts shows that the surface ores were formerly worked to some extent, development has not yet proceeded far enough to determine the importance of this vein.

The deposit formerly worked by the Gold Bug Company and now being explored by the



OPEN CUT AND TUNNEL OF THE EASTERN MINE

Aroroy Mining Company is located on the western end of Mount Kalakbao. The rock here consists of an irregular deposit of sandstone, shale, and conglomerate, apparently all derived from the adesites and pyroclastics of the Panique formation, which form the mass of the mountain These sediments are cut here by a basic dike of uncertain composition, but allied to the leucite-tephrite found 3 kilometers north of this dike. Small veins of blue quartz up to 1 meter in width, and oxidized only to a depth of about 1 meter below the surface, also cut these sediments. The shale is the lowest of the sediments and is found only near the basic dike in the Gold Bug open cut. It is nearly black and is heavily impregnated with pyrite along its cleavage planes. Under the miscroscope it is seen to contain numerous, fresh, angular fragments of plagioclase feldspar. It carries small values in gold, probably never exceeding 4 grams to the ton. The sandstone and conglomerate lie above the shale and grade into each other irregularly in a way to suggest stream deposition. These rocks in irregular areas along the surface contain values, and lines of old native workings are found in many places The ground was explored by the Aroroy Mining Company in a series of open cuts. These show the sandstone to be deeply iron-stained and oxidized almost to the consistency of clay for a depth of from 2 to 5 meters from the surface, where it changes rather suddenly to a blue, but still somewhat decomposed, rock more or less impregnated with pyrite. Values of 30 grams and over per ton are often obtained in the shallow oxidized zone, but where the color changes to blue and the rock becomes firmer, the values soon sink to 5 grams or less. Apparently, the whole deposit is the result of filling of the open spaces of the sandstone by mineralizing solutions and in the oxidized zone this has been greatly enriched by residual concentration.

The El Sol vein occurs farther east on Kalakbao Hill. This consists of iron-stained quartz, partly honeycombed but not banded, which may be the continuation of the Montana vein. Rich ore has been found in places, but at the time of my last visit no great amount of development work had been done The southeastern extension of this vein is cut off by the Pirate vein extending nearly east and west, one of the few in the district which do not follow the northwesterly strike.

The Syndicate Mining Company is working a group of claims on the central part of Kalakbao Hill.

The principal vein is known as the Nancy No. 1, and shows a width of 16 meters although not all in workable ore. The ore shows well-defined banding near the footwall, and is much broken and oxidized in the central and hanging wall portions. In the lower levels calcite forms a small proportion of the gangue. The assays show extremely irregular values, but the greater part of the richer ore, assaying 10 grams or over to the ton, occurs in irregular masses near the footwall. The Nancy No. 2 is situated near this vein and branching from it. This is smaller than the preceding, but contains patches of rich ore. The two veins join on the surface some distance to the southeast and also appear to approach in depth. Both seem to be cut off by the Mabel, an east and west vein nearly parallel to the Pirate vein, and about 300 meters to the south. An inclined fault, approximately parallel to the strike and following the grade of the steep hillside, seems to have displaced the upper portions of both veins. The upper level is for the most part less than 30 meters below surface, and the larger vein has rather irregular boundaries, surface slipping having greatly confused the relations of ore and country rock. As the vein forms the summit of the hill, the steep slope on the eastern side is deeply covered by a talus consisting almost entirely of quartz fragments. The ancient miners found this a profitable field, for stone mortars and pestles are found here in great numbers. It has been proposed to work this on a larger scale, but preliminary sampling by a series of small pits and open cuts, which, however, were not continued to bed rock, did not show sufficiently satisfactory values.

Another group of four veins has been developed to some extent by the same company on the Nebraska Star claim, some 400 meters to the east. Here the veins are narrower, at the widest never exceeding 4 meters, and then seem to pinch out to the northwest. The two which are farthest to the east are united at the surface and separate some 4 meters below. The ore, especially in the larger vein, is somewhat less oxidized and contains more calcite than in the Nancy veins. The best examples of the blue-gray calcite are to be found here. A mass of oxidized, iron-stained quartz occurs on the Have Got claim, about 400 meters southeast of the Nebraska Star veins, and possibly is a continuation of them. The workings have been caved for several years so that nothing definite could be learned of its relations. It appears to be a rather irregular, funnel-shaped body, possibly a local widening of smaller veins. The country rock surrounding this deposit is also reported to have carried a considerable proportion of values.

The above comprise the more important veins of the Aroroy region as now developed. Boston Hill, the southeastern continuation of Kalakbao, is known to contain several veins, one of which, rather narrow and of white quartz stained with iron oxide, shows in places unusually high values at the surface.

An interesting series of ancient workings on the Gilt Edge claim, on the southern end of Mount Kalakbao along a vein which, contrary to the usual rule, contains, even at the surface, a large proportion of calcite, can be seen to this day.

The property of the Tengo Mining Company is located 6 kilometers to the south of Mount Kalakbao. Here, one large vein, with possibly others parallel to it, outcrops on a spur of Mount Cogran. Not enough development work has been done as yet to determine with any certainty the relations of these veins. The ore is a somewhat brecciated quartz much stained with iron oxide, and in places near the surface carries values much higher than the average for the district. No extension of the Cogran veins to the northwestward has been found. There is no evidence that they have any tendency to pinch out at the northwest end of the spur, and it is possible that they are cut off by a fault.

Higher up the Guinobatan River to the east of Mount Vil-lon is a group of veins now worked by Mr. Hayes and his associates. These do not seem to follow the dominant northwesterly trend exhibited in the Aroroy district, but are supposed to form a network. Other deposits are said to exist in the main range still farther to the southeast, and it is

quite probable that further prospecting will develop new districts in this inland region.

Other metals.—Several manganese claims have been staked in the areas of red slates to the east of Balangting Creek and west of Mount Vil-lon, but no development work, and hardly even assessment work, has been done. As far as can be seen, the manganese ore psilomelane, occurs in lens-shaped bodies lying parallel to the slaty cleavage. Prospecting alone will show whether any of these lenses may prove to be of sufficient size for profitable exploitation.

Pebbles and boulders of a hard, massive hematite are often found in Aroroy Creek, northeast of Aroroy Mountain, but the outcrop from which these are derived has not yet been discovered. As this is near the southern boundary of the diorite intrusion, it is possible that the hematite may be a contact deposit on the border of the diorite

An outcrop of a small vein of iron-stained quartz which shows small specks of chalcopyrite with malachite and azurite, occurs on the Have Got claim of the Syndicate Mining Company, on the southeastern slope of Mount Kalakbao. This is of no commercial importance, and is interesting only as being the sole occurrence of copper minerals known in this district.

On the eastern flank of Mount Bagadilla, east of the property of the Colorado Company, is a vein in which small specks of galena have been found.

CONDITIONS.—*Location.*—Natural conditions are extremely favorable for cheap mining in this district. All the more important veins outcrop near the summits of steep hills, making possible a large amount of preliminary development work by means of adits. The ground, whether country rock or ore, stands well, and comparatively little timber is necessary. The deep zone of oxidation is, of course, a very favorable point and even if the ore bodies should not be found to be of workable grade in the sulphide zone, there is undoubtedly enough oxidized ore available to make mining profitable.

Transportation.—The more important mines are situated from 2 to 5 kilometers eastward from Port Barrera, which is as perfect a harbor as can be desired. At present the steamers anchor off the village of Aroroy and the freight is landed in small boats. From Aroroy a good provincial road runs to the Gold Bug mine, a distance of 7 kilometers, and is continued by private companies up the cañon of the Gunobatan. It is planned eventually to buiild a dock near Maguilanguilan Island and a road from there to the mines. This will make lightering unnecessary and will shorten by half the distance to the mines and will offer a much more sheltered harbor. Transportation is at present furnished by a fortnightly steamer from Manila, with occasional extra boats, and the run is made in about twenty-four hours.

Timber.—The greater part of the mining district and, indeed, the whole central range of the island, is heavily timbered. The district in this respect has a great advantage over others. Mine-timbers at present, are taken from the immediate vicinity of the mines, being cut by natives on contract.

Mr. Herbert, of the Colorado Company, has kindly furnished me with the following list of the species: Molave (*Vitex parviflora* Juss.), dungon (*Tarrietia sylvatica* Merr.), cubi (*Artocarpus cumingiana* Tréc.), bansalaguin (*Mimusops elengi* L.), matamata colorado (*Strombosia* ?), and matamata blanco (*Strombosia philippinensis* Rolfe).

Woods available for temporary timbering, as for example in stopes which eventually are to be filed, are lauan (*Shorea* sp.) and to-og (*Bischofia javanica* Bl.).

These timbers have been given in the order of their preference.

The following average prices, in Philippine currency, were paid for timber in 1909:

First group, one piece 7 feet long, squared 7 inches (in some cases only molave accepted)	₱1.00
The same, rough	0.75
Lagging (molave boards or poles of other first group wood) per running foot	0.01–0.02
Ties 4 feet by 4 inches by 4 inches, each	0.10–0.12

Besides the heavily-wooded central range of the island there is a large amount of excellent timber just across the bay from Aroroy, so there need be no fear of future shortage, if reasonable care is taken.

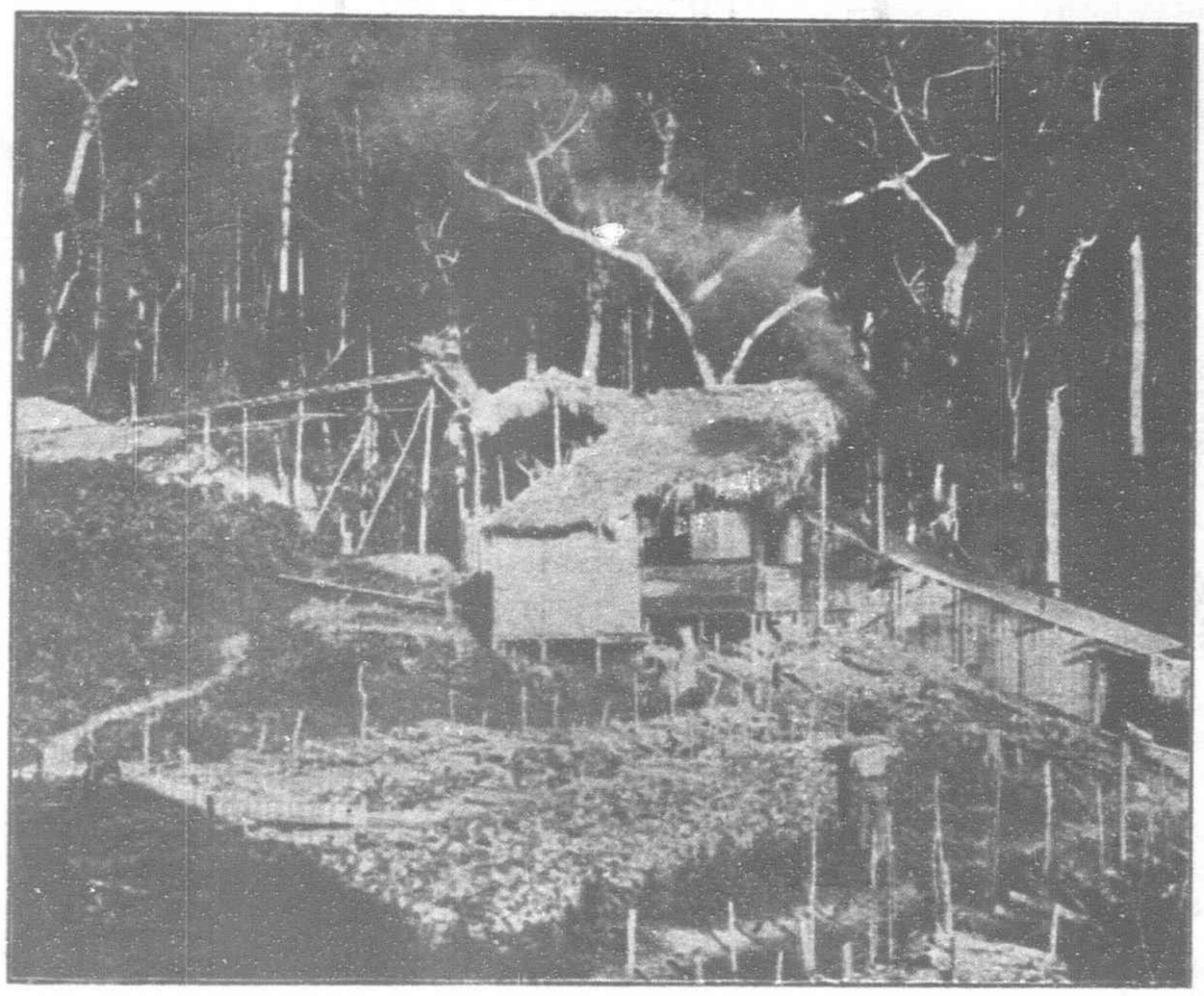
A more detailed study by Whitford of the forest conditions of the Aroroy district has recently been published.

Power.—The Guinobatan River runs nearly dry during the dry season and is subject to sudden heavy floods during the rainy season; although there is a good dam site just below its junction with the Kaal, it is doubtful whether the river will be valuable for water power. The Lanang River, on the other hand, drains a much larger district, has a more regular flow and a greater volume of water. A good dam-site exists at the falls in the upper gorge.

The mills and dredges previously in operation have used fuel from the large mangrove swamps on the eastern and southern shores of Port Barrera. Whitford estimates that the available mangrove swamps cover an area of about 10 square kilometers, but makes no estimate as to the amount of firewood *available per hectare*. The cost delivered at the mills and dredges varied from 4.00 to 5.00 pesos per cord and roughly estimated to be equivalent to rather less than one-half ton of Australian coal. The mangrove swamps, while affording a large amount of good firewood, are by no means inexhaustible, and when large mills start in the district the supply will be insufficient. Coal of fair grade is now being mined by the East Batan Coal Company and sold at this mine for 6.50 pesos a ton. The Cebu deposits should soon be producing. Promising coal deposits, as yet unworked, occur between Dimas-Alang and Kataingan on the Island of Masbate itself. Hence, even if it is not found advisable to develop water in the district, or if the power available is not sufficient, there need be no fear of a shortage of fuel.

Labor.—Aroroy is now in a better condition than the other districts in regard to labor. Work has been going on for a sufficient time to build up a class of fairly efficient miners (Plate III), and at present the local supply is more nearly sufficient for the demand than elsewhere. The natives finally have been educated to the point of working by contract, a method which has been found to be most satisfactory for all concerned, especially in the smaller workings, as the laborer works harder and generally receives a larger amount of money than if working by the day, and the employer is relieved of the necessity of such close supervision as is required when miners work for wages The wages paid in the dis-

OLD STAMP MILL ON THE MOUNT CROGAN PROPERTY



VIEW OF THE MILL ON THE EASTERN PROPERTY

*ELECTROLYTIC SEWAGE TREATMENT AT OKLAHOMA CITY, INCLUDING ESTIMATED COST OF OPERATION

Oklahoma City drains mostly into the North Canadian River, but partly over the divide to the north into Deep Fork. Two years ago the city built a septic tank, costing $8,000 to accommodate some of the people on the Deep Fork slope. Later on bids were received for contact beds to purify the septic effluent. The lowest bid for the contact beds was $17,000, and at this stage of the proceedings Mr. A. J. McMahan (representing the Electro-Sanitation Co. of Los Angeles) offered to install an electrolytic sewage treating plant for $12,000 and guarantee the results. The unsatisfactory results from the septic tank wrought a change of policy on the part of the city council and instead of building the contact beds, the council on advice of W. C. Burke, then city engineer, entered into a contract November 4, 1910, for the installation of an electrolytic plant to treat the Deep Fork sewage under the following guarantee:

Guarantee.—(1) The plant shall have ample capacity, when all units are in operation, to successfully treat 750,000 gals. of sewage each 24 hours. (2) The effluent shall be practically neutral and free from odor after the gases liberated by the treatment have had time to escape. (3) The effluent shall be practically free from disease germs and may be discharged into the creek without giving offence or endangering the health of the public. (4) The effluent shall not undergo secondary putrefaction under any climatic conditions. (5) The cost of electric for operating plant shall not exceed $ 750 per annum provided that the cost of current shall not exceed 5 cents per KW. hour.

Before the plant had been in operation two months, the use of the septic tank was abandoned except that the small grit chambers are utilized for eliminating the coarser matters. A by-pass now takes the sewage around the main chambers of the septic tank to the reservoir of the electrolytic plant. The results are much more satisfactory without the help of the septic tank.

Description of the Plant —Figure 1 shows a longitudinal section and plan of the plant; R is a 36,000 gal. reinforced concrete reservoir designed to hold the night run of sewage for the present and eventually to act in the capacity of an equalizer to relieve the plant of any sudden fluctuations in the rate of flow at different hours of the day. Three 8-in. supply pipes conduct the sewage from reservoir to treating flumes. F. W. is the wasteway for the treated sewage into the gulch. The supply pipes are separately operated by three valves V. The electrical machinery is on a platform about 15 ft. × 18 ft., 2½ ft. above the floor and about even with the tops of the flumes. On this platform are also a table and filing case. The drive consists of a 7½ H. P. alternating current motor M. using commercial current at 220 volts. This motor is direct connected, under the switchboard, to a 3 kw. multipolar direct current generator G, and exciter E, all resting on a single bedplate 2 ft. × 5 ft.; see Fig. 9. The combination is designed and built for this special service and delivers to the copper cable conductors of 1,000,000 circular mills 800 to 900 amperes at a voltage of 1½ to 3, these being the limit between which the desired results are obtainable, varying somewhat with the character of sewage. A double-pole, double-throw, knife switch allows the reversal of the current at pleasure and a knife switch at the upper end of each flume cuts on or off the current for that flume. Owing to the high amperage as compared with the low voltage the switches and conductors are necessarily heavy. If only one flume is in use the ammeter is set at 270 to 300. The building is of concrete blocks, see Fig. 7; 18 ft. × 50 ft. on the inside with flat roof and beams exposed on the inside, 8 ft. high over platform and 10½ ft. high over main concrete floor which has a slope of 1 inch, and on which the flumes are supported on wooden blocks 6 in. × 6 in. × 26 in. The building has one 3 ft. × 7 ft. door, one 6 ft. × 7 ft. double door, and 12 pivoted windows about 3 ft. × 3 ft. just above the ground line.

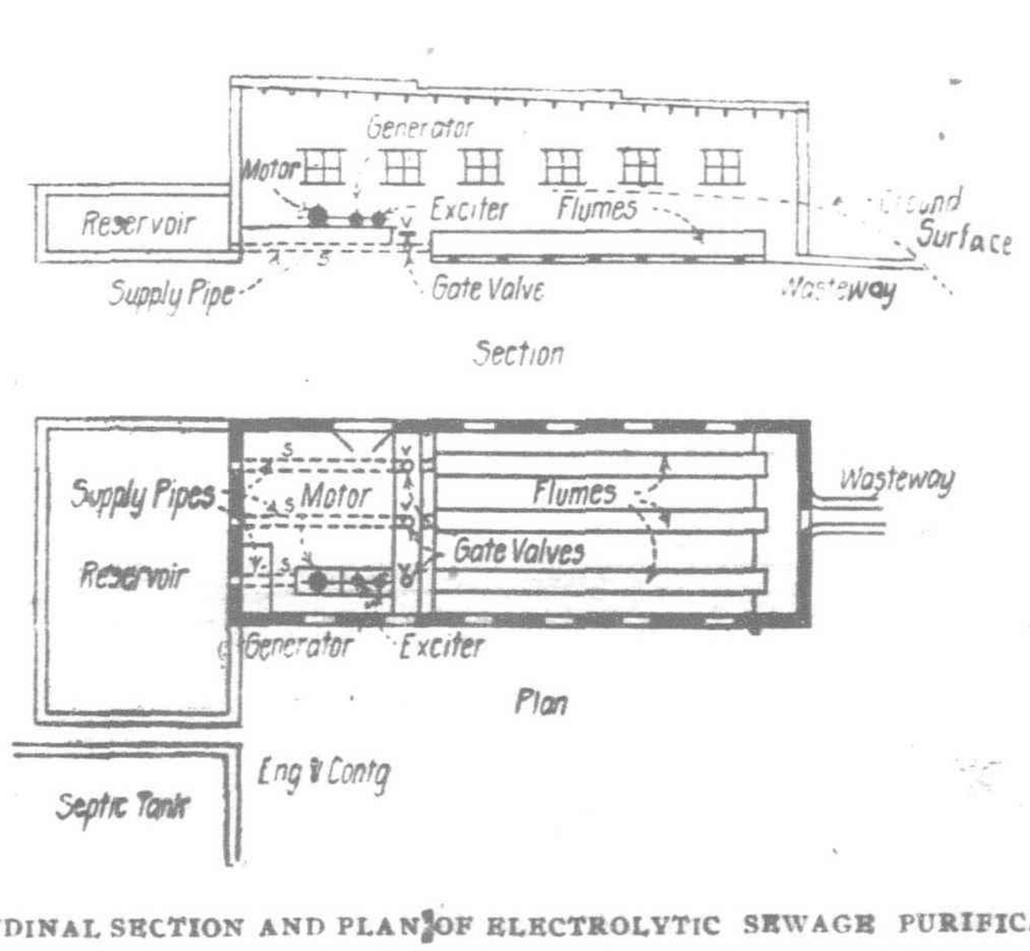


FIG. 1—LONGITUDINAL SECTION AND PLAN OF ELECTROLYTIC SEWAGE PURIFICATION PLANT AT OKLAHOMA CITY.

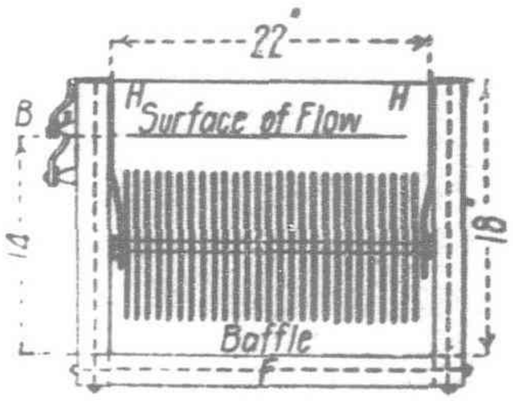


FIG. 2—CROSS SECTION OF FLUME.

Electrodes.—In each flume there are ten electrode sets, see Fig. 10, spaced about 6 ins. apart, each set consisting of 27 cast iron plates each 3/16 × 10 × 24 ins. Alternate plates of each set from the anode and cathode respectively, and are both separated and electrically connected by cylindrical bushing conductors C, see Fig. 3. These are fitted upon bolts on which they are drawn together for contact by nuts back of the hangers H. as shown in Figure 2. As these bolts hold up only the ends of the plates, two other bolts 1 in Fig. 3 of ⅜-in. iron covered with 1/16 in. rubber tubing are passed through the plates in the same plane with the conductor bolts, and on these bolts the plates are separated by cylindrical insulating bushings of hard rubber. Each of the 810 cast iron plates is capped for its entire length with a copper channel of No. 23 (16 oz.) copper 1½ in. × 24 ins., weighing ¼ lb. These copper caps add to the chemistry of the treatment and materially lengthen the life of the electrodes by protecting the plates along the upper edges where the corrosion would otherwise be abnormal. The plates must be decomposed to perfect the treatment but it is desirable to have the decomposition as evenly distributed as possible and the gases arising tend to throw the reactions to the tops of the plates. Each set of plates with bolts, insulators, and hangers forms a complete detachable, interchangeable unit.

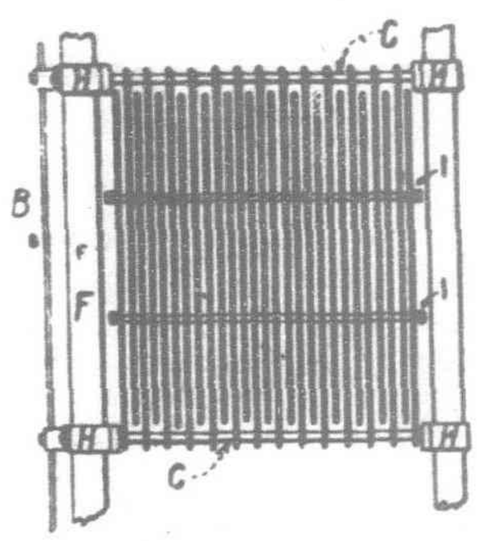


FIG. 3—PARTIAL PLAN OF FLUME.

Flumes —The three flumes are 18 ins. deep, 22 ins. wide, and 30 ft. long, made of 2-in. plank, dressed and painted three coats, held in shape by light bolts every 16 ins. inside and bottom and by light iron straps across the top every 6 ft. as shown in Fig. 2. The flumes are spaced 3 ft. apart; where the planks butt against each other wooden splines are used, and there being practically no pressure there is no trouble in making a tight flume. Each flume has two insulated copper bus bars ⅜ in. × 1¼ ins., which bring the current from the knife switch at head of flume and from these bus bars the plates are charged through copper straps connecting the bus bars B with hangers H, see Fig. 2. These straps have each 1/10 the conducivity of the bus bars. Baffles X, 3 ins. high, prevent any truant microbes from scamper-

*Contributed by Howard V. Hinckley, Consulting and Supervising Engineer, Oklahoma City, Okla., for the *Engineering and Contracting*.

trict are: Laborers and muckers, 0.60 peso per day if food is furnished, or 0.80 peso without food; miners, 0.80 peso per day with food, or 1 peso without; foremen, blacksmiths, etc., from 1.50 pesos to 2 pesos per day.

During the next two years, when several companies start operations on a large scale, there may be a temporary shortage of labor, but I do not expect any permanent trouble from this cause, as laborers are beginning to come in of their own accord from northern Panay and Sibuyan and there should be no great difficulty in importing others if it became necessary. I have been told that, under average conditions, 9 men working 3 to a shift six days in the week, and doing their own mucking, can advance a tunnel 3 feet per day in "porphyry" and 1.5 feet per day in hard fine-grained rock. Owing to the irregularity of the native as a laborer, it will always be necessary to have at call a larger force than actually is necessary at any one time. There may be considerable difficulty in keeping a full force at work on Sundays and holidays, but I believe enough men could always be counted on to keep a mill running steadily. The company stores and laborers' houses, and a system of fines for absences without permission, have already done much to correct the unsteadiness of native labor.

ing along the floor under the plates. They are of sheet metal hinged at the upper edge over a light rod so that when not in use they may be lifted by a wire handle out of the way for washing out. Fixed baffles of sheet metal on the sides of the flumes projecting 1½ in. and located at the upper ends of the electrode sets, prevent the tnuants from sneaking along the sides of the flume. Two inches of clear space is allowed under the plates for flushing. At each end of the flume there is about 18 ins. of clear space and between the electrodes about 6 ins. At the lower end of each flume is a cross plank on which is fitted an adjustable weir gate which both regulates the depth of the water over the electrode plates and measures the flow, see Fig. 8. The weir is adjusted by means of nuts on two vertical bolts T. but it is found in practice that the spring of the plate and bolts is ample to hold the weir in position and the nuts are seldom used. There is also a washout gate Y that lifts up out of the way for flushing. The water is generally kept 2 ins. deep over the plates as this seems to give as good results at either greater or less depths.

Operation.—The current from the commercial wire is turned into the motor which drives the generator. The ammeter is set at 270 to 300 according to the operator's judgement. The valve is opened to supply raw sewage from the reservoir to one flume, or the ammeter may be set at 810 to 900 and the valves open to all three flumes with volt meter reading from 1½ to 3. The baffles are lowered and presently the plates are submerged and the sewage becomes milky. It is in a state of thorough and minute ebullition and before it commences to flow over the weir at the foot of flume it is covered with a white foam of gas bubbles. The impurities in the sewage passing between the plates which are spaced ½ in. apart, and which are alternately anodes and cathodes, have become the electrolyte, short circuiting the current. and millions of globules of water have been decomposed into the original elements, hydrogen and oxygen, which, being liberated in the nascent or formative state, produce remarkable results. The offensive odor, which is strong in the reservoir, has disappeared upon entering the flume. Sulphuretted hydrogen cannot exist in the presence of ferric exide in the electrolytic treatment. The treatment goes on down the flume and down into the gulch below the plant as the sewage and froth of gases roll over each other. There is no scum on the treated sewage except the white froth of generated gases and there seems to be a material lessening of the scum previously accumulated in the gulch.

The time taken by a particle of sewage to pass through the flume and through the ten electrode sets when treating 250,000 gals. per flume per 24 hours, is about 3 minutes. An increase of amperage gives an increase of diffusion or volume of current and consequently of ebullition, while an increase of voltage puts more iron and copper into the chemistry of the treatment. A very small portion of the sludge is collected upon the plates through the agency of the ferric hydrate. Several years ago, when the "Electro" was in the embryonic state, the plates were cleaned by steam through perforated pipes laid on the bottom of the flumes. This was both expensive and unsatisfactory. They are now cleaned by simply reversing the current and the sterilized sludge when thrown off from the plates has the color of ferric oxide. By the reversal of the current the uneven corrosion of the plates is again eliminated. The low voltage necessary to decompose the water and organic matter is in contrast with that reported by Mr. J. L. Campbell in 1908 when he utilized the same process for removal of scale from hard boiler water at a pressure of 112 to 115 volts. the treatment costing $479 per million gals. The electrolytic methods—ideal for sanitary or organic purification—seems so far to be wholly unsuited for the removal of scale.

Chemistry.—The process is electro-chemical. Oxygen, hydrogen and chlorine are liberated in the nascent state; are powerful reagents and render the effluent neutral—a result not obtained by either chemical or biological treatment. Owing to oxidization no traces are left of albuminates or nitrogenous bodies, which give so much trouble in the way of secondary putrefaction in septic treatment. Nitrates are changed to nitrites and the iron and copper compounds coagulate and clear the effluent. The oxy-chloride of lime and magnesia destroys dangerous (including typhoid) bacteria while the free sulphuric acid generated in the process kills cholera germs if present.

Compared with Electrolytic Plant at Santa Monica, California.—The electrolytic plant at Santa Monica, Cal., has its outfall in the surf at the bathing pier. Even there—with nature lashing the oxygen of the air and the chlorine

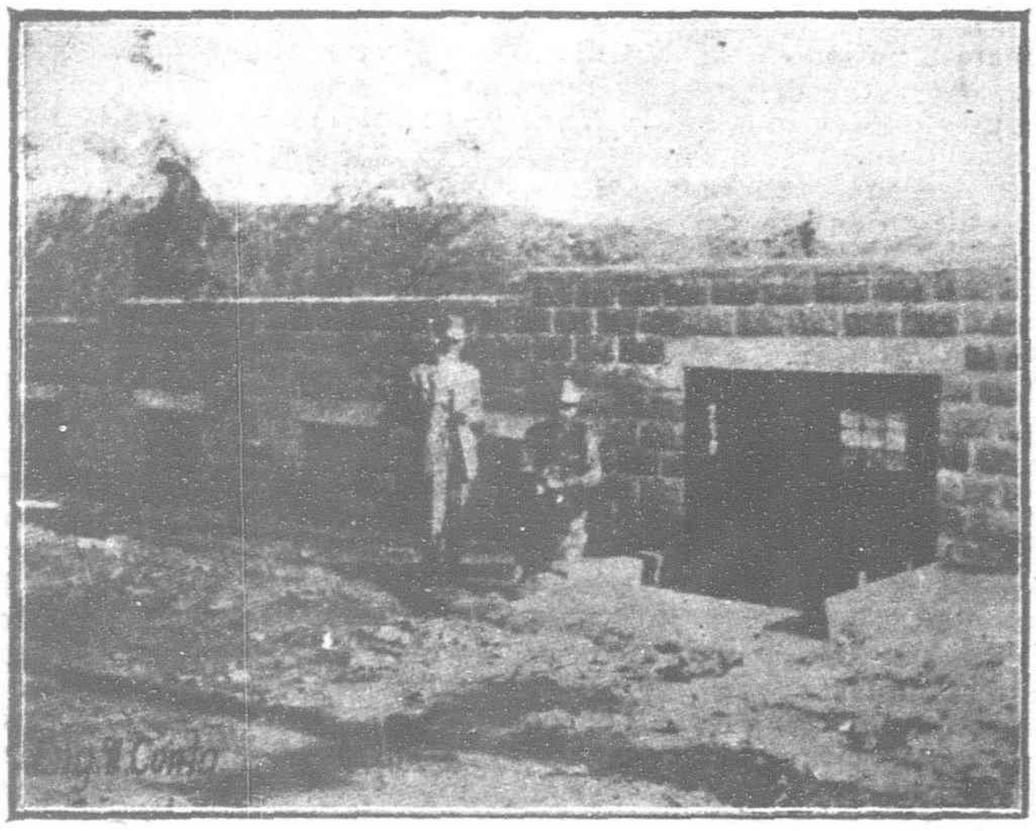


FIG. 7—EXTERIOR VIEW OF PLANT

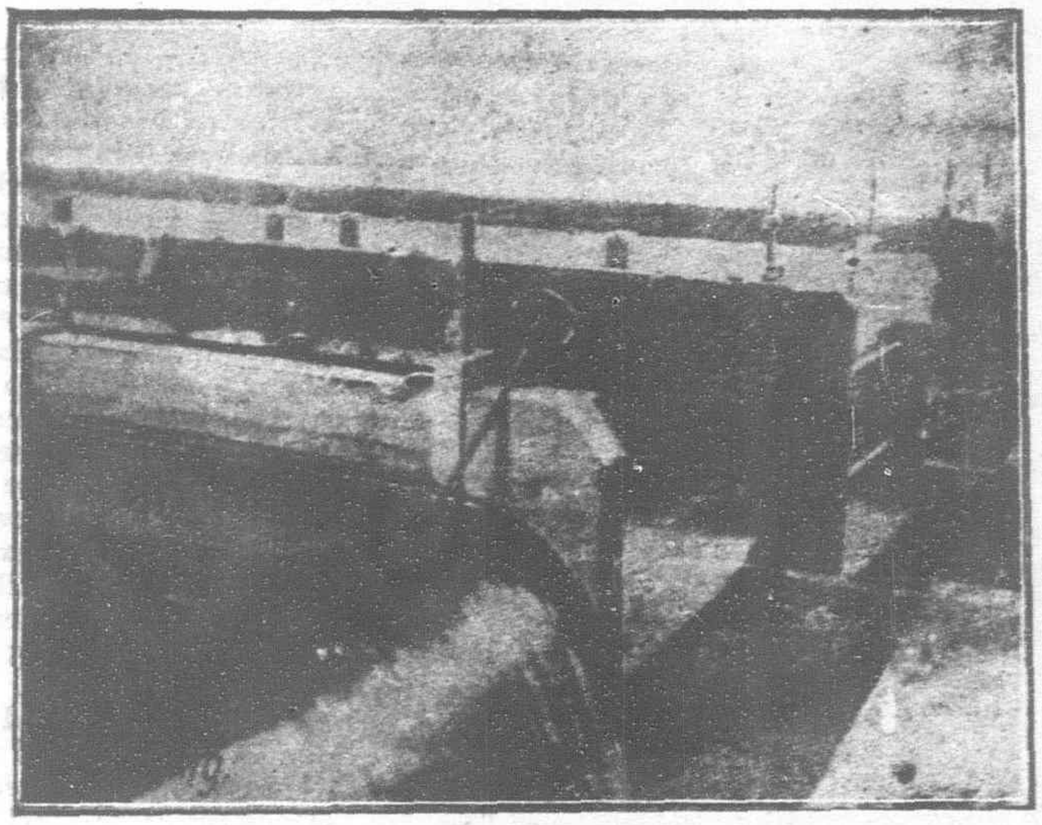


FIG. 8—OUTFALL OVER WEIR AT FOOT OF FLUME. ONLY ONE FLUME IN OPERATION

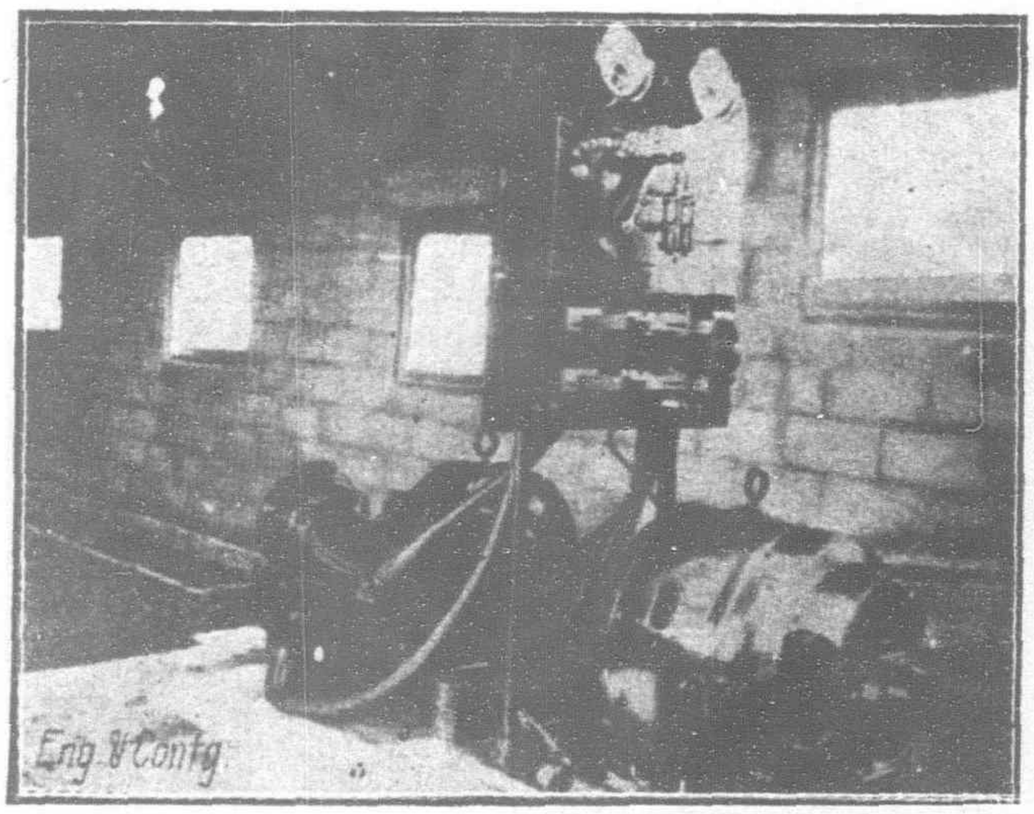


FIG. 9—DIRECT CONNECTED MOTOR, GENERATOR AND EXCITER

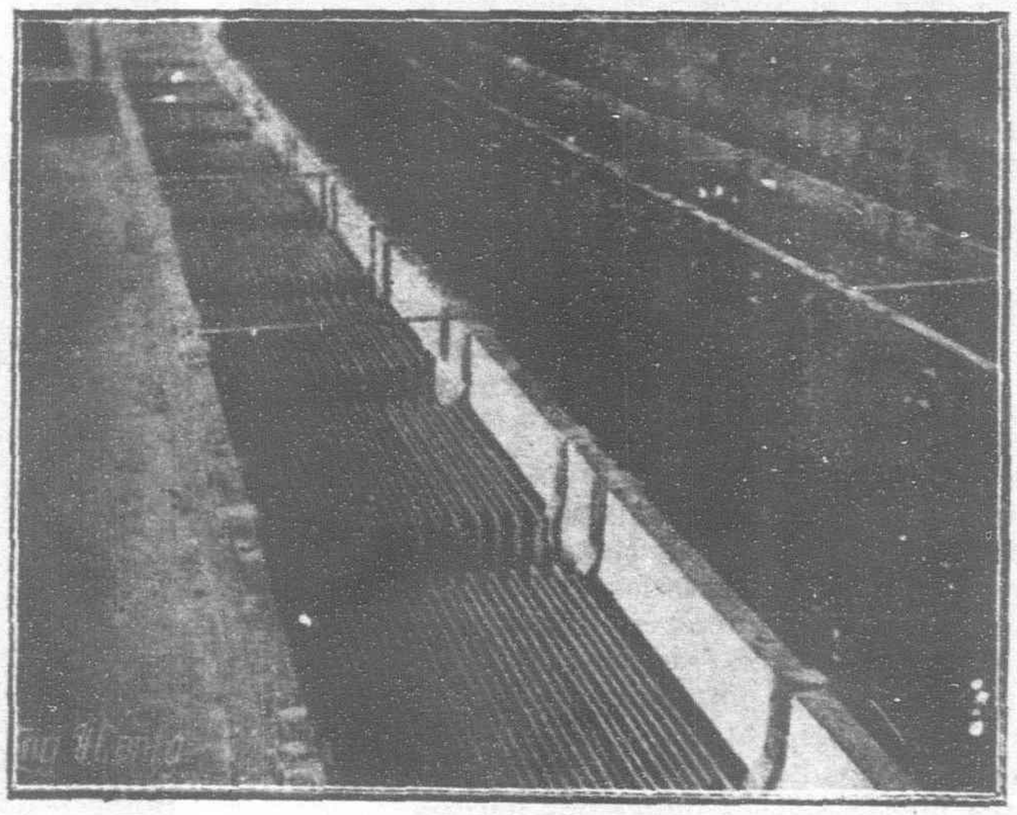


FIG. 10—ELECTRODES IN ONE FLUME. THE OTHER FLUME IS IN OPERATION

of the sea water into her purification process by wave action—a nuisance was noticeable when the plant was temporarily shut down. What then might be expected when a half-million gallons of sewage are dumped daily into a dry gulch, for six months of one of the driest seasons ever known in Oklahoma, and especially when the septic tank, and later the grit chamber, have been periodically cleaned out and emptied into the same dry gulch? The official report of the city bacteriologist says that "below the tanks (flumes) and long before the material has reached the creek the outflow was clear and quite limpid and distinctly free from odor."

Bacterial Reductions —The following tests, made at the three different times at two different places, tend to show a reasonable percentage of destruction of pathogens in the process as well as a reasonable uniformity of results obtained.

Dr. Frederick Salathe, Santa Monica, Cal., reported November 16, 1908, bacteria removed 99.1 per cent. "And those remaining were completely destroyed."

Louis A. Turley, state bacteriologist, Norman, Okla., reported October 2, 1911:

	Per Cent.
Flume No. 1 reduction—Total bacteria.	86.0
Flume No. 1 reduction—Disease bacteria.	98.5
Flume No. 2 reduction—Total bacteria.	88.0
Flume No. 2 reduction—Disease bacteria	98.4
Wasteway 20 ft. below reduction—Total bacteria	99.0

Clarence E. Lee, city bacteriologist, Oklahoma City reported September 30, 1911.

Flume No. 1 reduction—Total bacteria	99.75
Flume No. 2 reduction—Total bacteria	99.82
Wasteway 20 ft. below plant—Red total bacteria	99.83

Dr. Lee says: "It is a noteworthy fact that after leaving the plant the number of germs relatively decreases and the ordinary algae, which do not seem to be affected in the least by electrolysis, relatively and rapidly increase. I find from examination that those germs which are not killed by this process are so markedly inhibited that they are easily cared for by the ordinary algae found in all surface water consequently with increased admixture with ordinary algae and exposure to air and sunlight the objectionable features are rapidly removed in proportion to the distance from the plant. The findings 20 ft. below the plant correspond to several thousand feet below in small streams in untreated material."

Referring to the last quotation above the absence of odor in the gulch after six months of deposit of sewage therein (the septic tank and grit chamber having always been cleaned out into the gulch) seems quite remarkable. The gases carried into the gulch, tumbling over and over with the water, seem to have continued the purification work far below the plant.

On recommendation of Guy E. Blackwelder, Commissioner of Public Works, the Deep Fork plant was unanimously accepted by the municipal commissioners October 6,1911, and plans have been ordered for a similar plant for the Packingtown district which is to treat not less than two million gallons daily and to cost not more than $42,000.

Sludge.—One of the greatest nuisances of sewage treatment is the disposal of the sludge. With a reasonable breaking up of the legitimate solids by a long run or by centrifugal action there is but little sludge that needs to be taken out, the finer particles all being thoroughly oxidized in the flumes. As to whether the coarser and foreign matter shall be held back by baffles or by screens or both is simply a matter of detail. Experience with this plant seems to indicate top and bottom baffles followed by a vertical screen over face of grift chamber outlet—the screen to be handy of access through the manhole cover for cleaning.

Cost of Operation.—The cost of current, guaranteed not to exceed $750 per annum or $2.74 per million gallons should probably average about 810 amperes at two volts costing 4 cts. per kw. hour plus 25 per cent motor loss equals $709 50 per annum. The item of plate renewals is not guaranteed but in the Santa Monica plant treating a half million gals. per day, this item has not exceeded $150 per annum. The attendant at the Oklahoma City plant is paid $55 per month and has the use of house and grounds. His duties keep him busy for two or three hours a day. He could easily handle two or three plants, a mile apart—or five miles apart, if fairly well connected by street car service.

The total estimated cost of operation, including proper fixed charges, is given in Table I.

Table I.—Estimated cost of operating Oklahoma City Electrolytic Sewage Putrefication Plant.

For—	Per Annum.	Per Million Gallons	Per Thousand Gallons
			Cents.
Electric Current.....$	709.50	$2.59	0.259
Attendant.....	660.00	2.41	0.241
Lights.....	40.00	0.15	0.015
Total operating.....$	1,409 50	5.15	0.515
Renewal of plates.....	200.00	0.73	0.073
Depreciation of electric machinery.....	100.00	0.37	0.037
Five per cent on investment	800.00	2.92	0.292
Total operating and fixed charges.....$	2,509.50	$9.17	0.917

The investment charge is computed upon $16,000, of which $1,000 is for attendant's residence and $15,000 is understood to be the price hereafter for a three quarter million gallon plant. This plant, however, being introductory, was built "under the market" for $12,000. In a larger plant these figures would be reduced 20 to 30 per cent. It seems inadvisable to make any statement as to the general cost of electrolytic treatment of sewage per capita—even approximately—as long as water consumption per capita is reported all the way from 30 to 300 gals. per day and sewage flow from 15 to 300 gals. The cost must be computed upon the basis of the sewage flow in each case.

Conclusion.—The work done by this plant seems to justify the following conclusions; (1) That the septic tank in connection with the electrolytic sewage treatment is a hindrance—not a help. (2) That sedimentation in connection with the electrolytic treatment of sewage is neither necessary nor helpful. (3) That a centrifugal for atomizing the solids and a screen, or series of baffles, or both, for the elimination of the incorrigibles, seems advisable. (4) That a forebay or reservoir, which may be used to hold the night run during the earlier life of the plant, and to act as an equalizer when operated 24 hours a day, is advantageous. (5) That the necessary chemicals for the treatment of sewage are furnished by the electrolytic process. (6) That the nuisance and expense of handling sludge may be largely (but not wholly) eliminated. (7) That the effluent from the electrolytic treating plant is sterilized, deodorized, neutral, non-putrescible, and harmless.

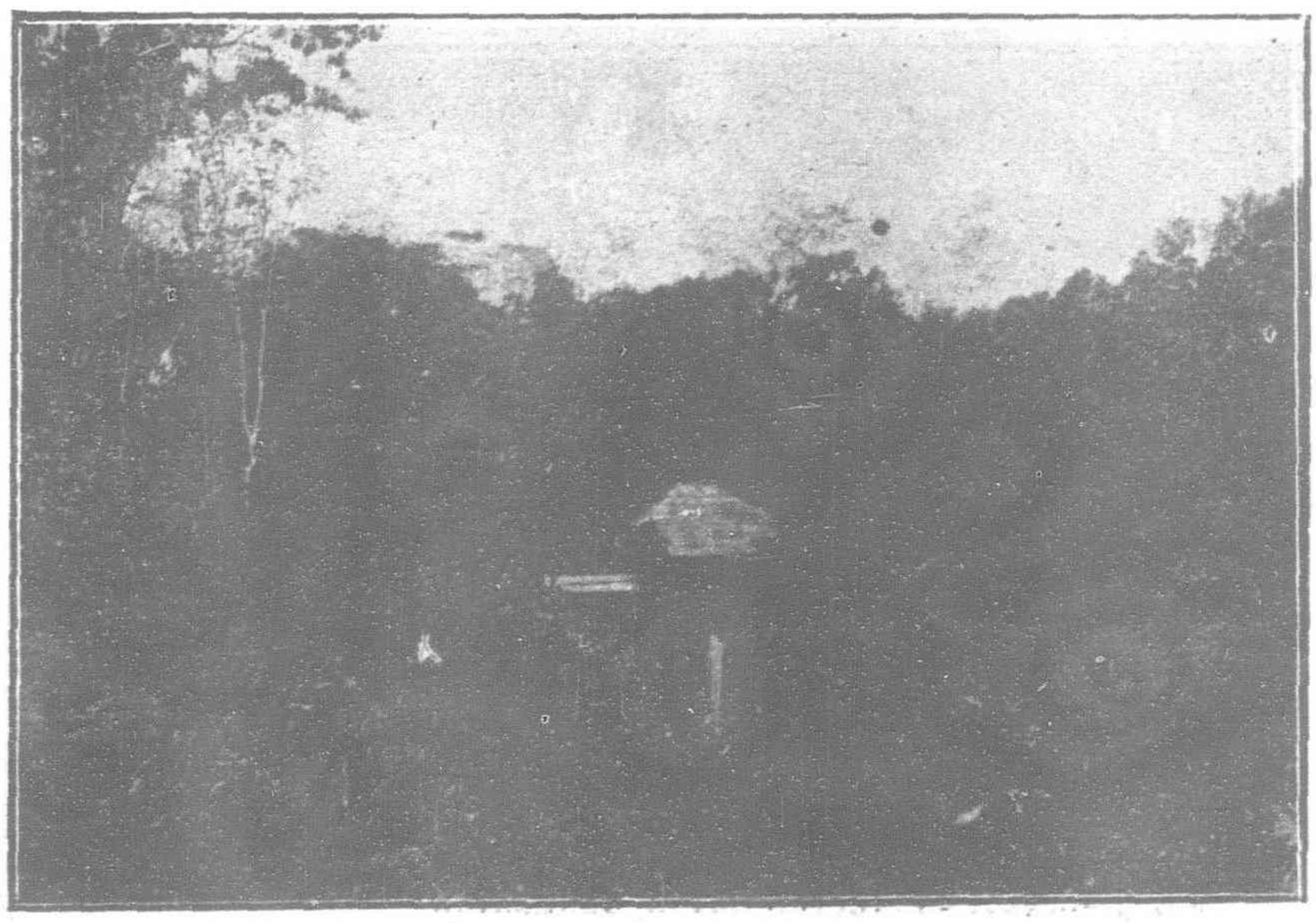
MINERAL RESOURCES OF SUMATRA

From Menggala, a village some 70 miles inland from the southeast coast of Sumatra, on the banks of the Toelang Bowang river, the journey to the main hill range of the country is made in praoes, a style of craft unsuited to the average height of Europeans, who, when necessary to move about, constantly come in contact with the plaited bamboo and thatch roof, a protection alike from sun and rain. Most of the time on board is spent sitting down, with the legs thrust out from the body at an angle of 45 degrees. For purposes of transport through the jungle, the water buffalo is requisitioned, which is depicted in the illustration loaded with a miscellaneous assortment of necessities. Failing this useful animal recourse has to be made of native carriers.

The monotonous journey in the praoe comes to an end at Negeri Batin, some 220 miles inland, on the tenth day after leaving Menggala, the country passed through consisting entirely of dense primitive jungle, interspersed here and there with small villages, surrounded by a clearing, the inhabitants obtaining a living by collecting the products of the jungle, gums, wild rubber, etc., and by cultivating pepper, while in the higher reaches, numerous natives exist from the proceeds obtained by panning the river sands for gold.

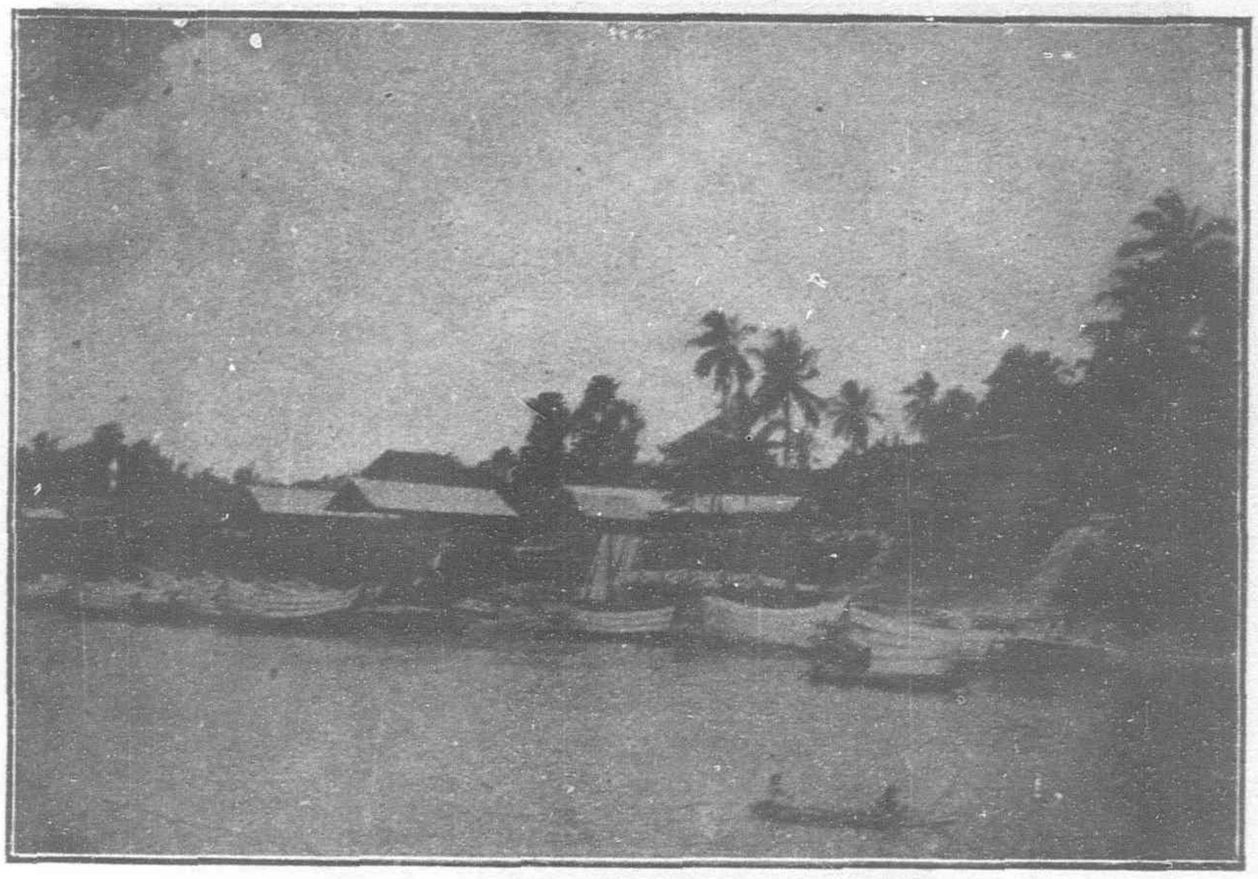
Rumours of their operations having leaked out through the native traders, who periodically penetrate to the higher reaches of the country, became responsible for a one-man expedition to investigate on a small scale, the truth or otherwise of the rumours of the existence of payable gold in this region.

The country around Negeri Batin is wild in the extreme, and barren of humanity, with the ex-

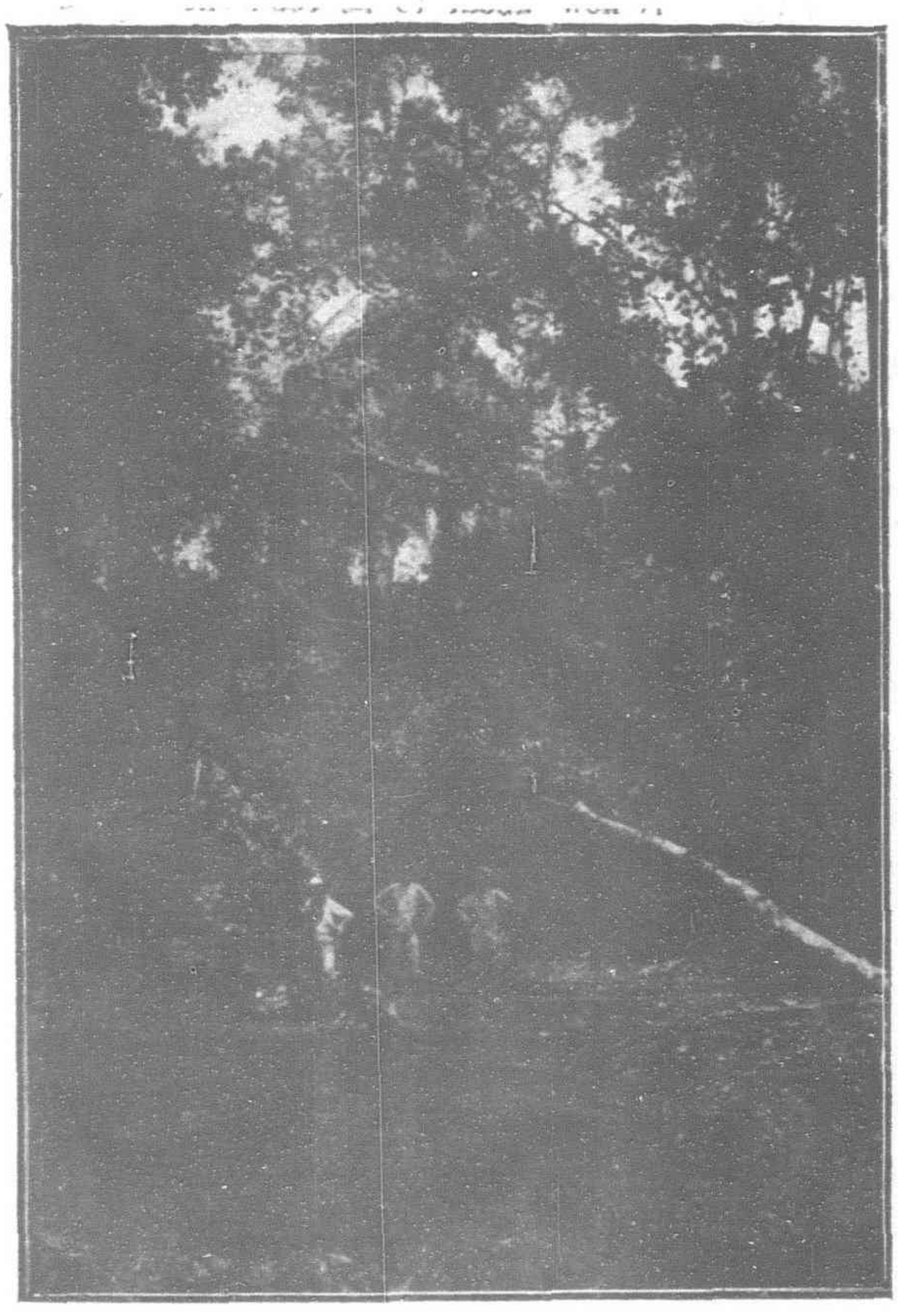


HEADQUARTERS OF THE PIONEER PROSPECTING EXPEDITION

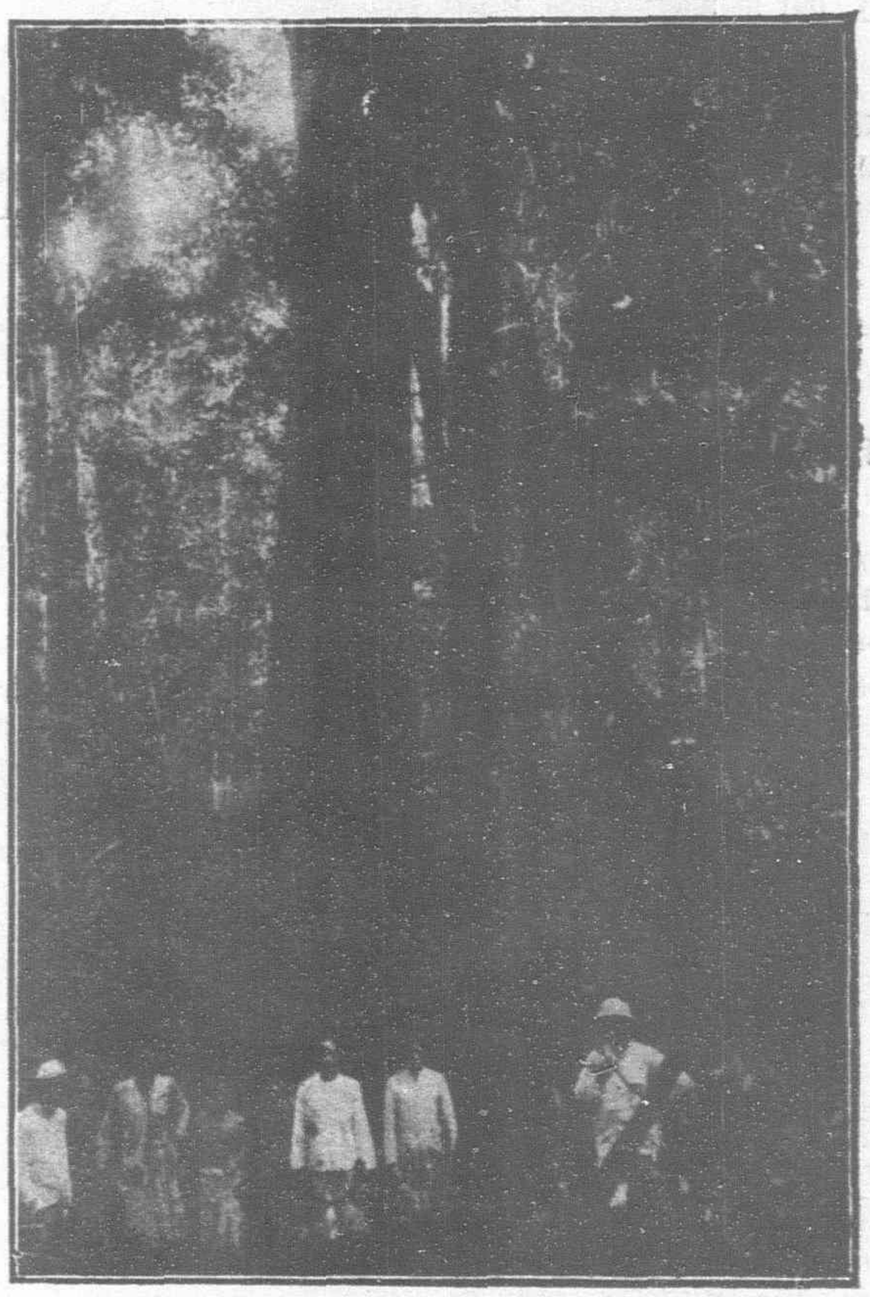
THE MAIN (AND ONLY) STREET OF NEGERI BATIN, SUMATRA. AT DUSK EVERY-ONE IS INDOORS AND OUT OF DANGER



LANDING STAGE AT MANGGALA SHOWING PRAOS IN ONE OF WHICH JOURNEY WAS MADE



NATIVES WASHING GOLD

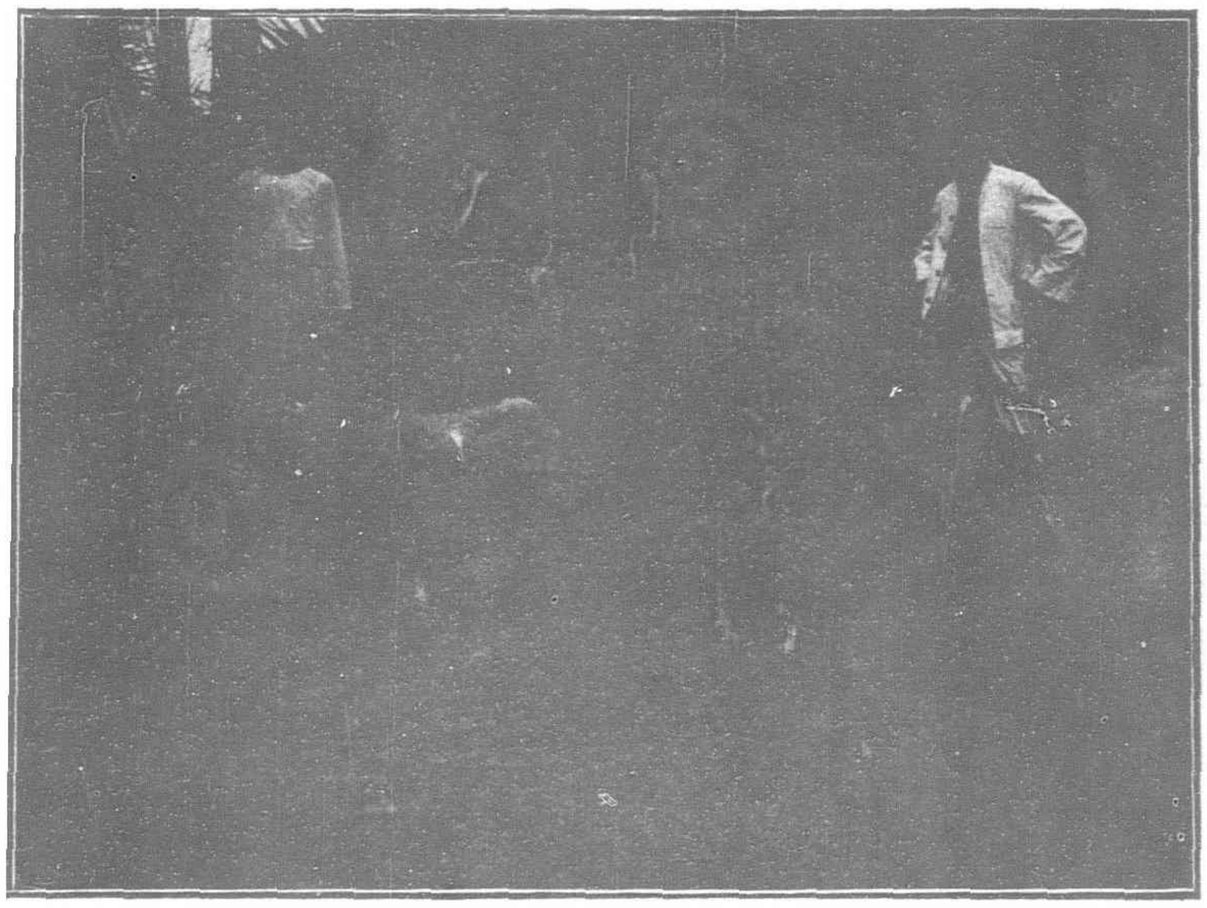


JUNGLE SCENE SHOWING WILD RUBBER VINES

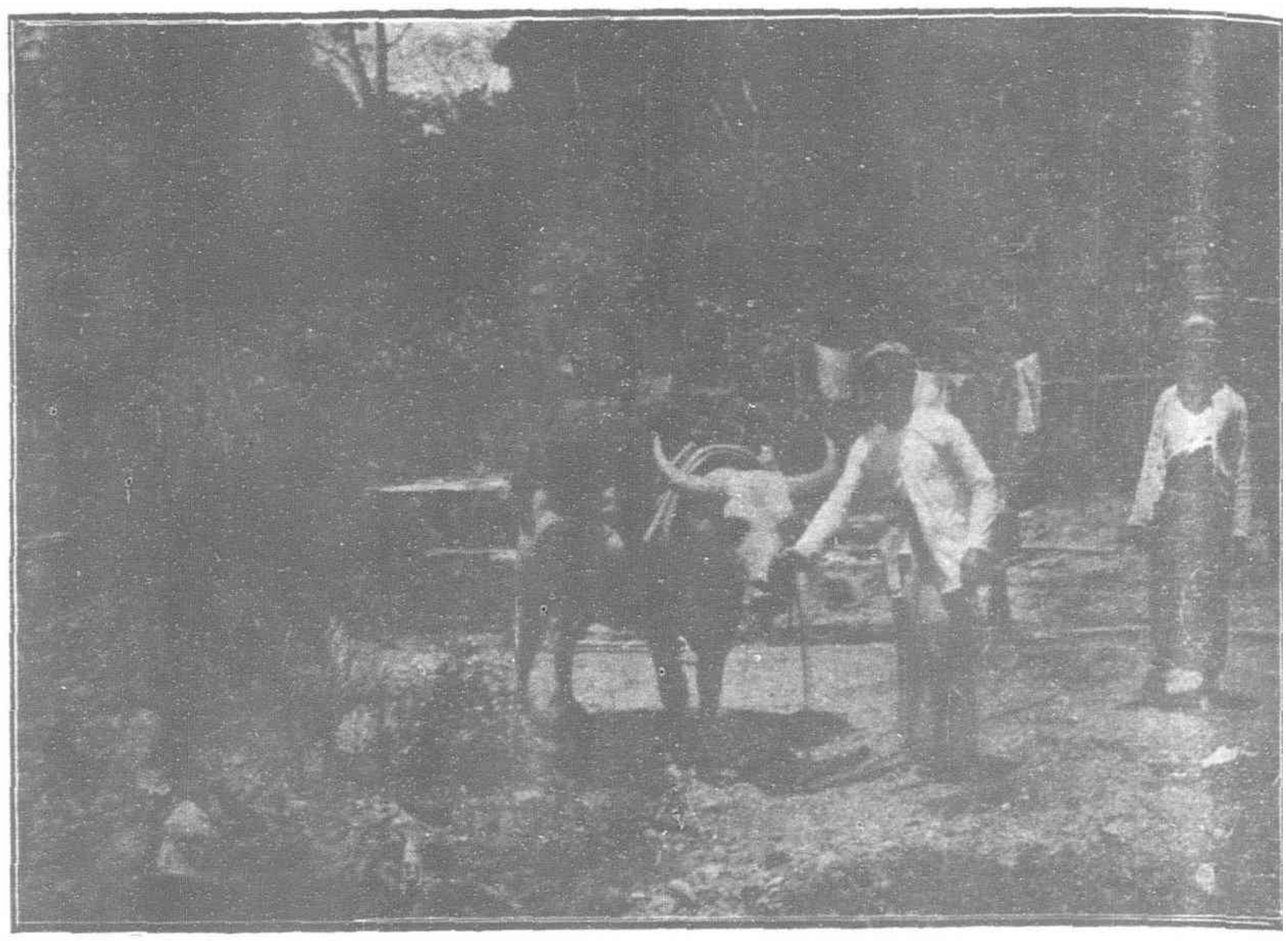
ception of the numerous small villages interspersed along the river banks. Elephant, tiger, pig, and large game of every description, roam undisturbed through the surrounding jungle, the elephants frequently breaking down the palisading which surrounds each village, and destroying in one night the labour of months, while tiger and crocodile are responsible for an enormous loss of life.

The general formation of the country around Negeri Batin consists of a series of low hills, rising alternately from 35 feet to 100 feet above the level of the river Oempoe, the general level of the country rising in a southwesterly direction towards the main range of mountains which traverse Sumatra in a north and south direction.

In the vicinity of Negeri Batin, test holes were put down in various directions, and the ground extracted panned. The bed rock consists of diorite. Above the bed rock, which was here found at an average depth of 10 feet, lies a bed of loose gravel, quartz pebbles, etc., which contains most of the gold. This bed of sand, which is loose, varies in thickness from 2 to 6 feet, and is covered with from 4 to 7 feet of clayey ferruginous soil, carrying gold in small quantities. On the crests of several hills this overburden has been denuded, exposing the wash, and on one hill, several samples gave an average value of 4 dwts. 8 grains (3 dollars 64 cents). Fourteen sq. miles in this district was prospected, and gold was found to be disseminated throughout the entire area. At the lowest estimate viz: taking the over-burden of auriferous clayey soil at an average depth of 7 feet, and the wash at an average depth of 2 feet, and omitting entirely the samples returning 4 dwts. 8 grains, as being of enriched local value, the result of the numerous samples taken over the above area, gave an average return of 8 grains (28 cents), this being the lowest yield referring to the total depth, including every class of ground from loamy surface soil to bed-rock, taken as it came from the bore.



THE GOAT IS OF COMMON USE FOR TRANSPORT IN AND ABOUT MANGGALA.



WATER BUFFALO TRANSPORT THROUGH THE JUNGLE.

The gold obtained was generally light and scaly, but in many cases, where gold was panned from the river gravels by the natives of the district, it showed an average coarseness of rice.

Water is plentiful and can be obtained under pressure, but labour is difficult to obtain locally, the population being scanty and unwilling to exert themselves more than is necessary for a hand to mouth existence.

The roads leading to this district are bad, the best means of transport being a light draught launch to tow freight boats and for passengers. The main line of railway, proposed to eventually penetrate through Sumatra from north to south, is now about to be commenced from Telok-Betong in the south, and is intended to pass within a short distance of this district.

Altogether some 300,000 acres has been applied for in this region, and a London Syndicate, that holds large interests in California and West Africa, have taken an option over nearly one-third of this area.

FAIRBANKS-MORSE MARINE ENGINE EXHIBIT

FAIRBANKS-MORSE Engines certainly ought to attract the attention of those interested in securing power for pleasure boats. Unique designs of fly-wheels will be used on Type "E" and "G" Engines, specially designed for pleasure boats. Also on the Type "K" Engines for cruisers and heavy craft. The fly-wheel is designed so that the operator may grasp the fly-wheel with one hand and pull it up against compression, and start the engine quickly without crank danger of kick-backs.

This feature makes it possible for women and children to operate FAIRBANKS-MORSE Engines with absolute safety. The 12, 18, and 24 HP Type "G" Engines will be fitted with Delco ignition with quick starting switch, so that the engine can be started on compression, the operator opening the throttle and closing the switch in stopping.

The small size 3½ HP Type "E" single cylinder, bore 3¾", stroke 3¾", is especially adapted for small boats. The 7 HP Type "E" two cylinder is a light weight, high speed engine, especially adapted for pleasure boats and light runabouts, up to 20 feet. This engine has been the favorite with many purchasers.

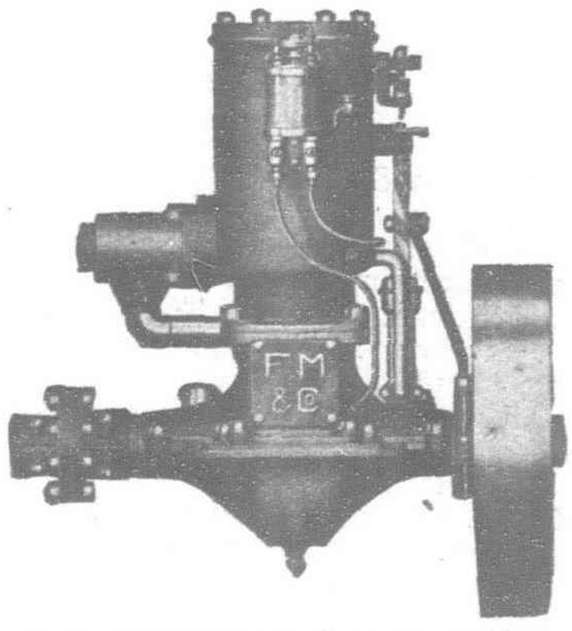
The Type "G" line consists of one, two, three and four cylinder engines developing 6, 12, 18, and 24 HP respectively. These engines are designed especially to give hard continuous service. The two, three and four cylinder engines are regularly fitted with Delco ignition, or timer, and coils. This line is practically the same as built in the past two seasons with a few features added

The new Type "K" Engines will consist of one cylinder, bore 5½", stroke 6", develop 7½ H. P., and a two cylinder, developing 15 H. P., at 550 RPM. This engine is fitted with "make and break" ignition, plunger pumps, and manifold combining intake and exhaust hot air adjustments to carbureter. The cylinder head gasket does not come in contact with the water. The water is by-passed to and from the head through outside water connections. The bearings are of bronze, unusually large, removable and interchangeable. The cylinders are cast separately from the crank chamber making a three piece engine of the most rigid construction, with all parts very easily accessible. Lubricating is by gravity system or through carbureter. Base explosions in this engine are prevented by a new and ingenious device.

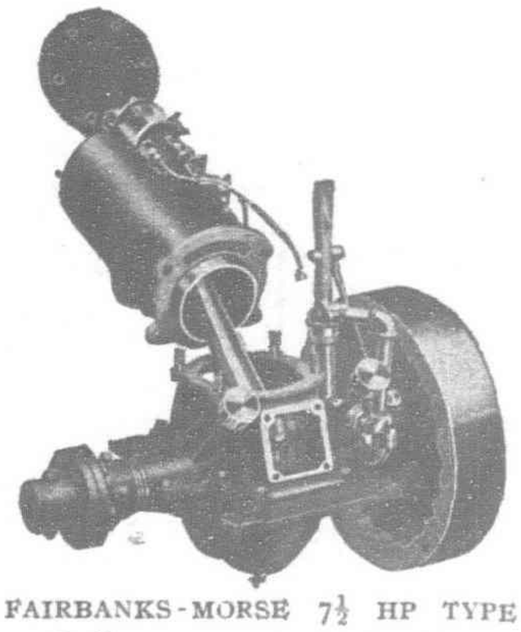
These engines are liberally designed and will operate successfully on low grade fuels. The designer claims great economy in fuel on Type "K" Engines. This should attract every intending purchaser.

The exhibit at the Boston and New York shows will consist of one each of the above described engines, together with sectionalized parts and engine sectionalized, and operated by electric motors, so that every working part can be examined by intending purchasers.

An interesting booklet showing size and types of boats in which these engines have been used is being published and will be mailed upon application. The 1912 catalogue is now ready for distribution and will be mailed to anyone addressing the home or any branch office of Fairbanks, Morse & Co.



FAIRBANKS-MORSE 7½ HP TYPE "K" MARINE ENGINE.



FAIRBANKS-MORSE 7½ HP TYPE "K" MARINE ENGINE WITH CYLINDER REMOVED.

THE PHILIPPINE CONSTABULARY

This organization comprises 303 officers and 4,167 men distributed in 119 stations and represents the police arm of the Philippine government. The commanding officer is detailed from the United States Army. At the present time General Bandholtz is in command. The force originally comprised 7,500 officers and men and was active for years suppressing brigandage and guerrilla bands. As conditions in the islands became more normal, it was gradually reduced to its present strength. The Bureau of Constabulary is under the control of the Department of Commerce and Police. The report of the Secretary of that department gives some idea of the varied duties of the Constabulary soldier. He is responsible for the maintenance of law and order, assists in maintaining quarantine for the Bureau of Health and the Bureau of Agriculture. During the fiscal year 1911, they performed quarantine work for the Bureau of Health in 22 provinces and served as guards for the Agricultural Bureau in 26 provinces.

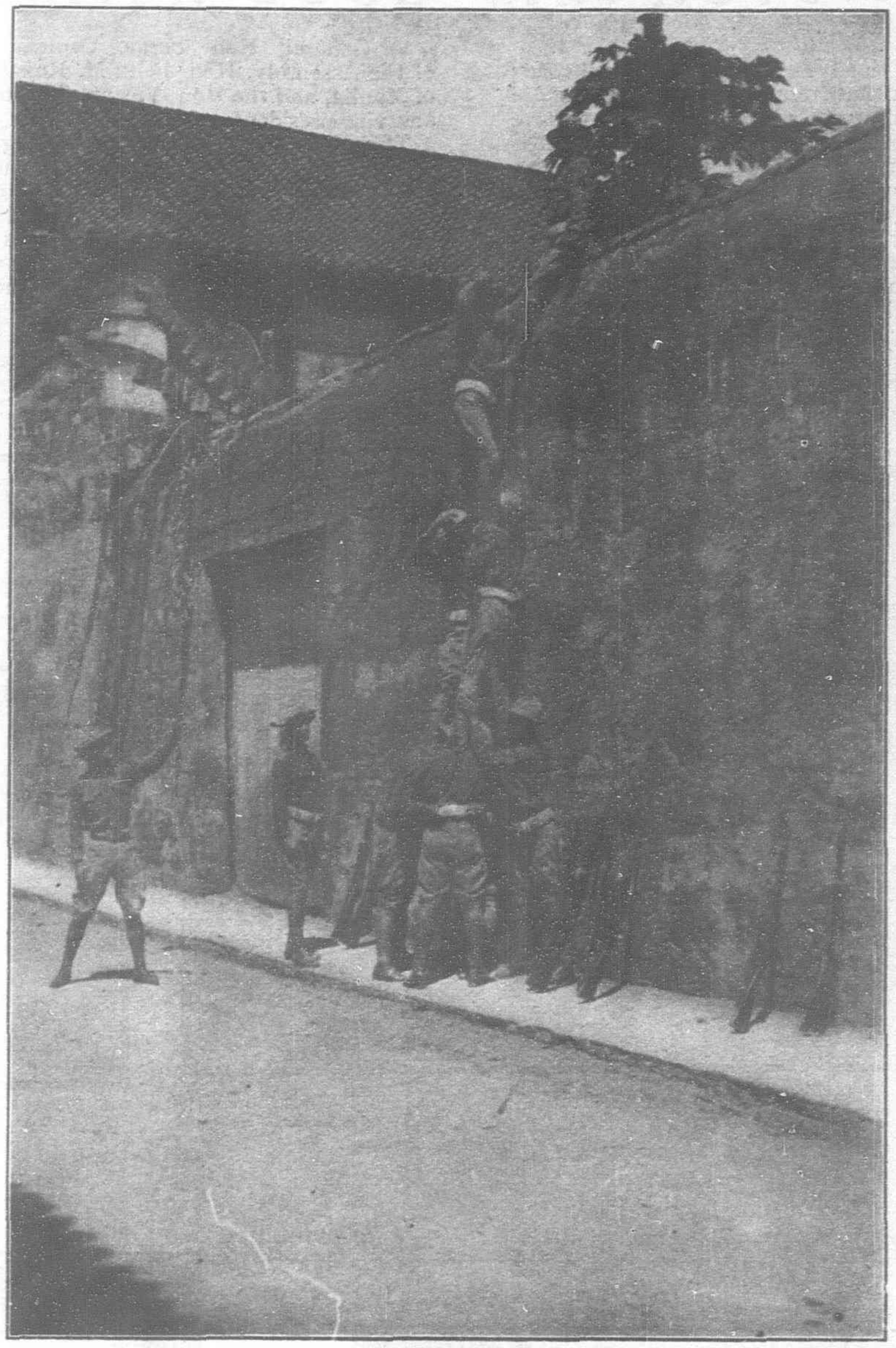
In Mindanao the Constabulary have been active in the field against hostlile Moros and in the campaigns of the last fiscal year two officers and one noncommissioned officer were awarded medals for conspicuous valor in action.

Strict discipline is maintained throughout the organization. The Constabulary soldier is well set-up, efficient, loyal, and in action displays unusual courage. The accompanying illustrations published by courtesy of the Secretary of Commerce and Police give an idea of the constabulario on parade and in the field.

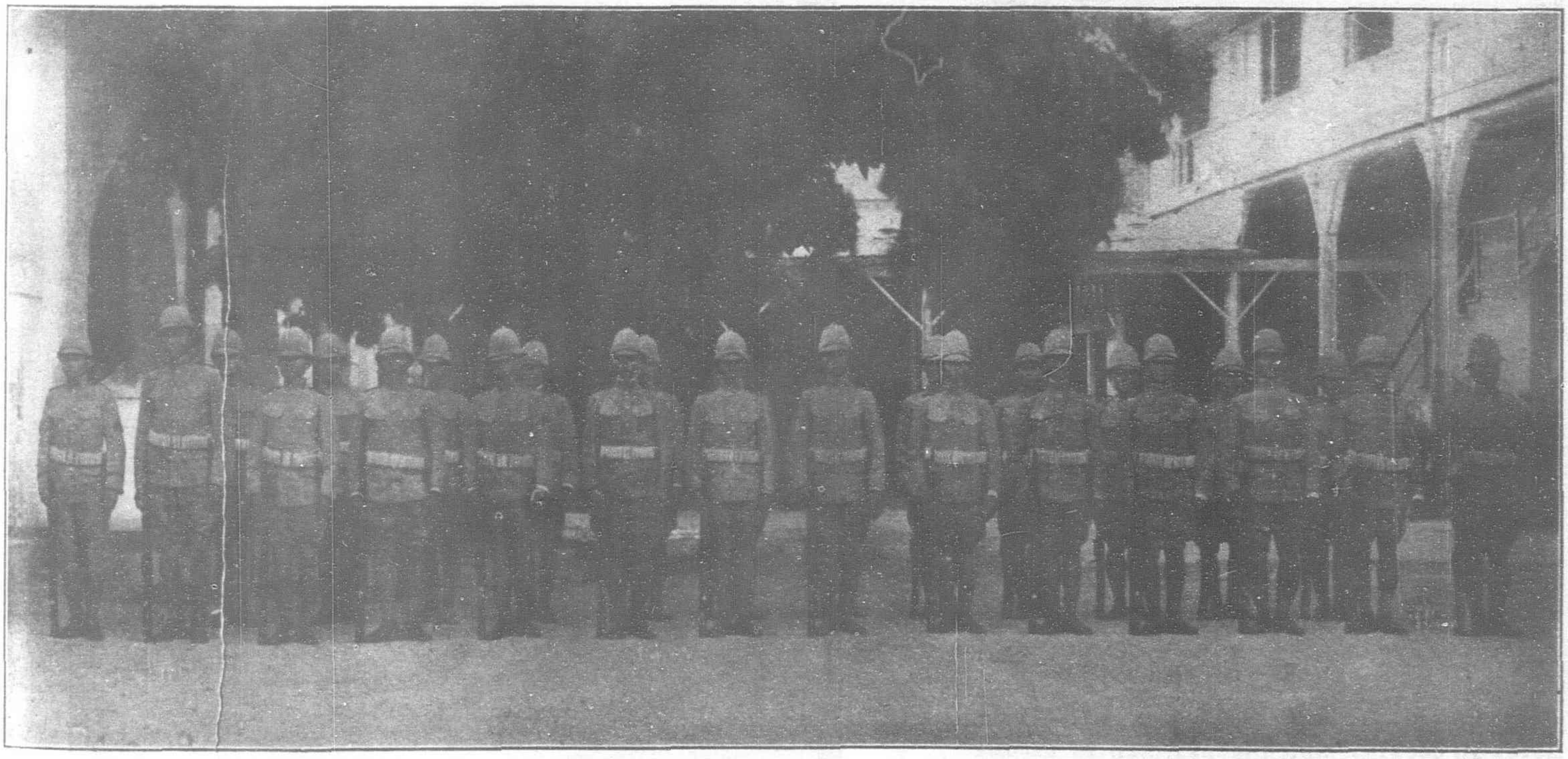
As the force must be ready for every emergency its mobility is essential to successful operations. For this purpose motorcycles are being rapidly introduced and mounted detachments are maintained at the different stations.

Recently recommendations were made for an increase in the officers pay from ₱3,400 to ₱3,600 for captains, from ₱2,800 to ₱3,000 for first lieutenants and the pay of second lieutenants fixed at ₱2,400 for the first two years and, at the expiration of that period, increased to ₱2,800.

During the period of active operations in the field the Constabulary was not popular, but as brigandage was stamped out and order restored, the force began to be appreciated by the natives. It now enjoys the confidence of all elements of the population and petitions from provincial authorities to have the force increased in their respective districts are not unusual.



PHILIPPINE CONSTABULARY SCALING A WALL



COMPANY OF PHILIPPINE CONSTABULARY, 1911.

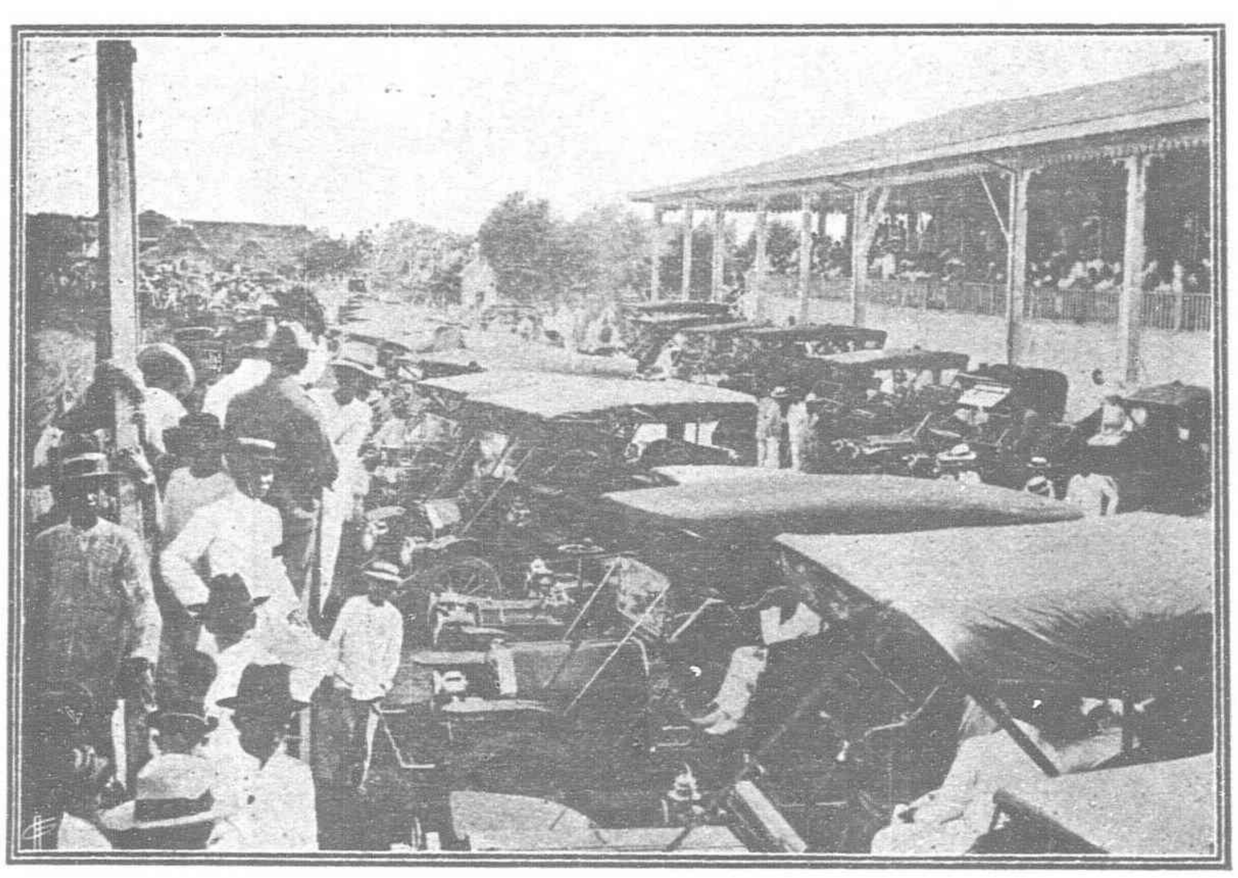
THE MOTOR AND GOOD ROADS IN THE PHILIPPINES

The invasion of the Philippines by the automobile served to advance interest in good roads with the result that from Manila several splendid highways leading to places of interest have been completed. This is also true of other large centers throughout the archipelago, where the motor is rapidly displacing the carriage and the carabao cart.

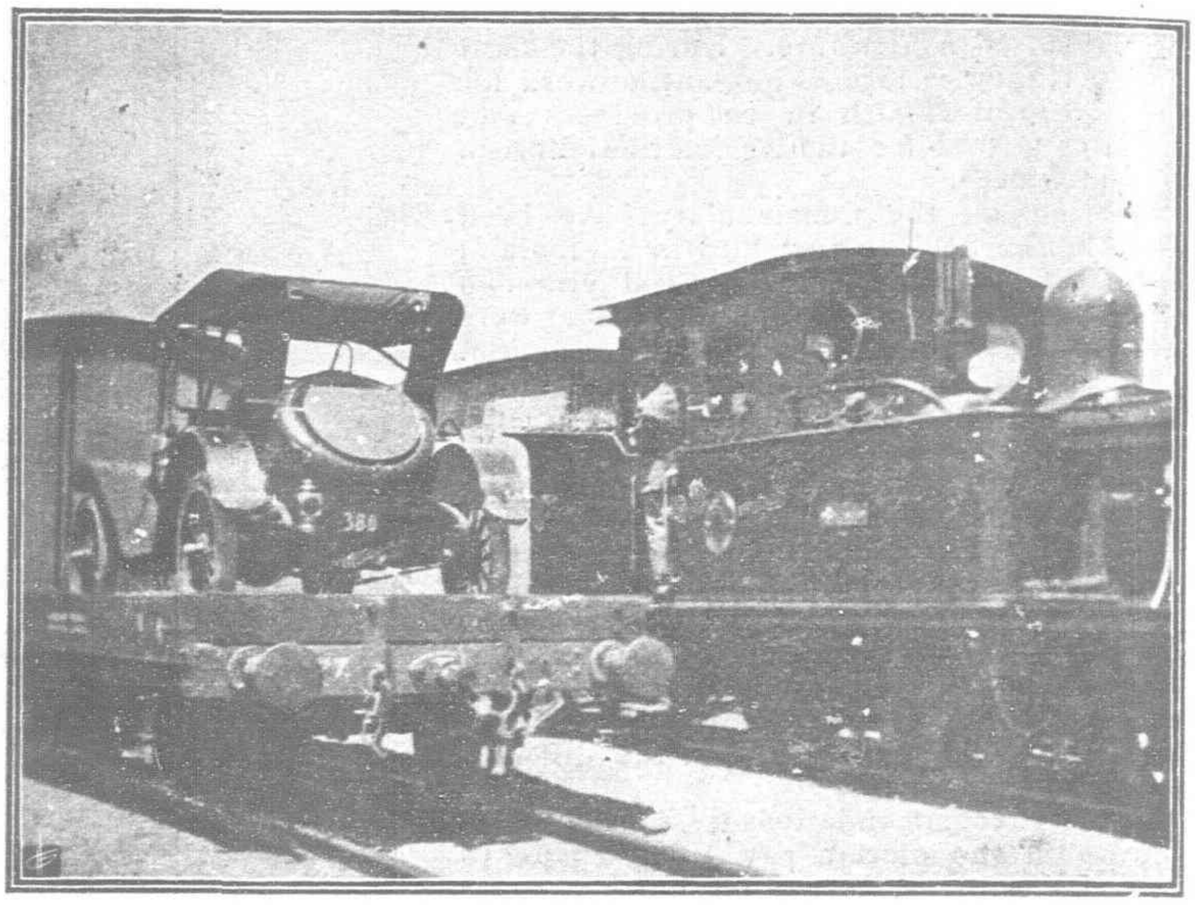
In January, 1911, the Manila Automobile Club was organized for the encouragement and the regulation of the use of automobiles for recreation and business, and the development and betterment of roads and highways in the Philippine Islands. The honorary president of the club is Governor-General Forbes with the Hon. Newton W. Gilbert, now acting Governor-General, Hon. Sergio Osmeña, Speaker of the Assembly, Hon. Felix M. Roxas, Alcalde of Manila, and the Hon. Vicente Singson, honorary vice-presidents.

Their first work was the furthering of legislation for the proper regulation of automobile traffic which resulted in the passage of an act covering comprehensively the operation of the motor according to well defined rules and providing adequate punishment for their violation. Then the Good Roads program was undertaken. This latter secured prompt response from the provincial authorities who have shown a marked spirit of co-operation. Good roads were essential to the development of the provinces. With the automobile club in sympathy, and working in co-operation, several hundreds of miles of roadways formerly indifferently maintained, equipped with temporary bridges and thus impassable the greater part of the year were advanced to the permanent column.

Governor-General Forbes has been a continuous advocate of good roads and through the activity of the Bureau of Public Works expression has been given in a substantial manner to this feature of the policy of his administration. Co-operating with the government, the Automobile Club has been active in directing attention to those sections where points of interest were isolated and which could be easily reached by minimum expenditure. Short impassable breaks repaired connected up sections previously

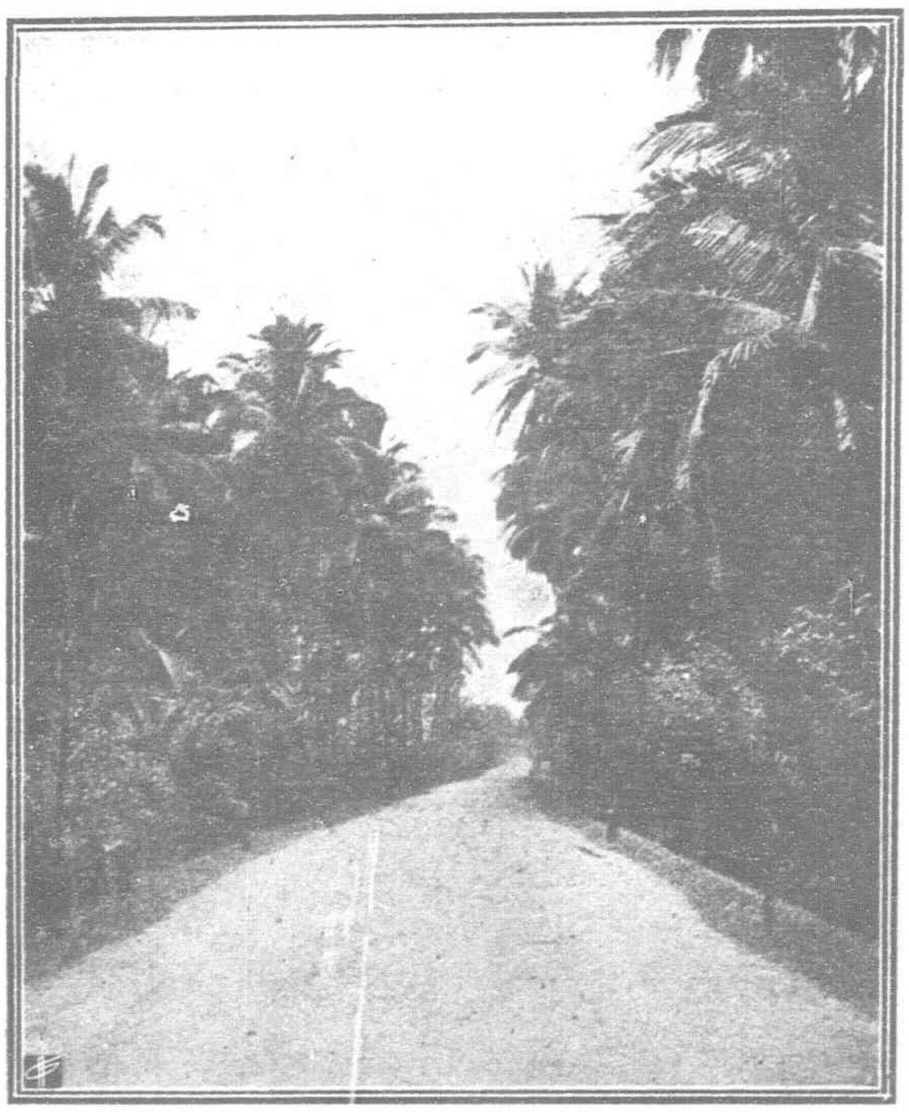


VIEW OF A SMALL PART OF THE BIG CROWD PRESENT AT THE SAN LAZARO RACES IN OCTOBER, 1910



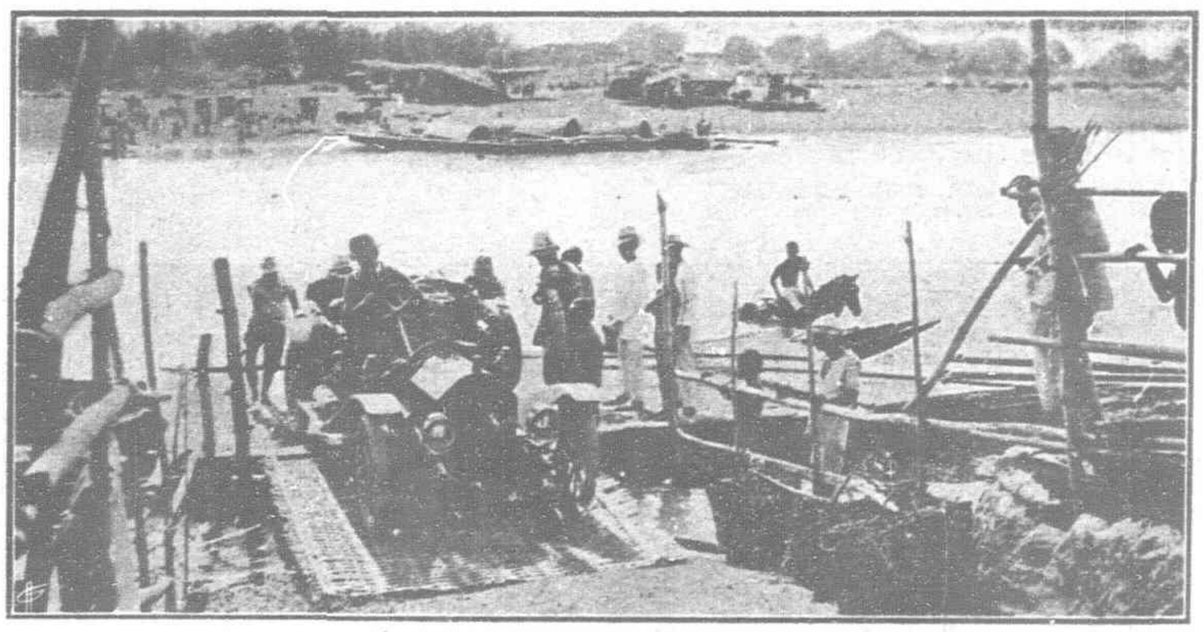
SHIPPING BY FREIGHT

LOADING AND UNLOADING AUTOMOBILES IS A VERY SIMPLE MATTER IN THE PHILIPPINES. FREIGHT AND EXPRESS RATES ARE MOST REASONABLE

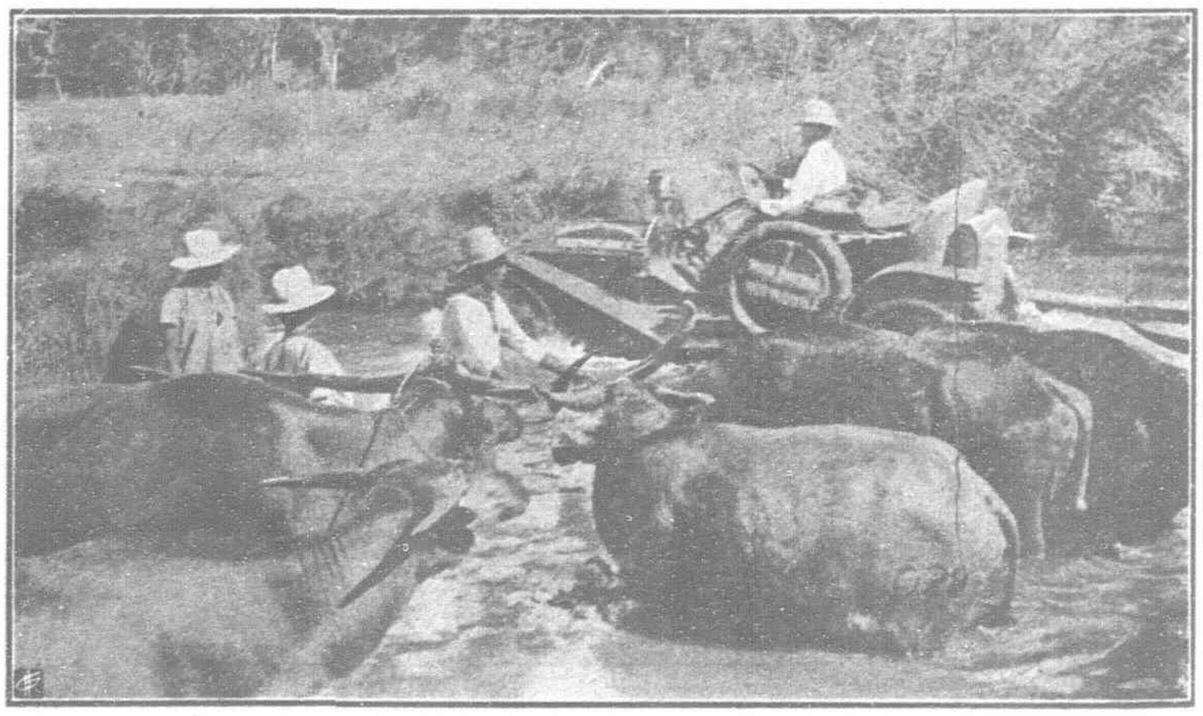


THE BOULEVARDS OF THE SOUTH

A STRETCH OF ROAD NEAR SAN PABLO IN AN IDEAL MOTORING COUNTRY WHICH IS DESTINED TO BECOME THE MOST POPULAR RUN OUT OF MANILA UNTIL GOOD COMMUNICATION IS ESTABLISHED WITH BAGUIO

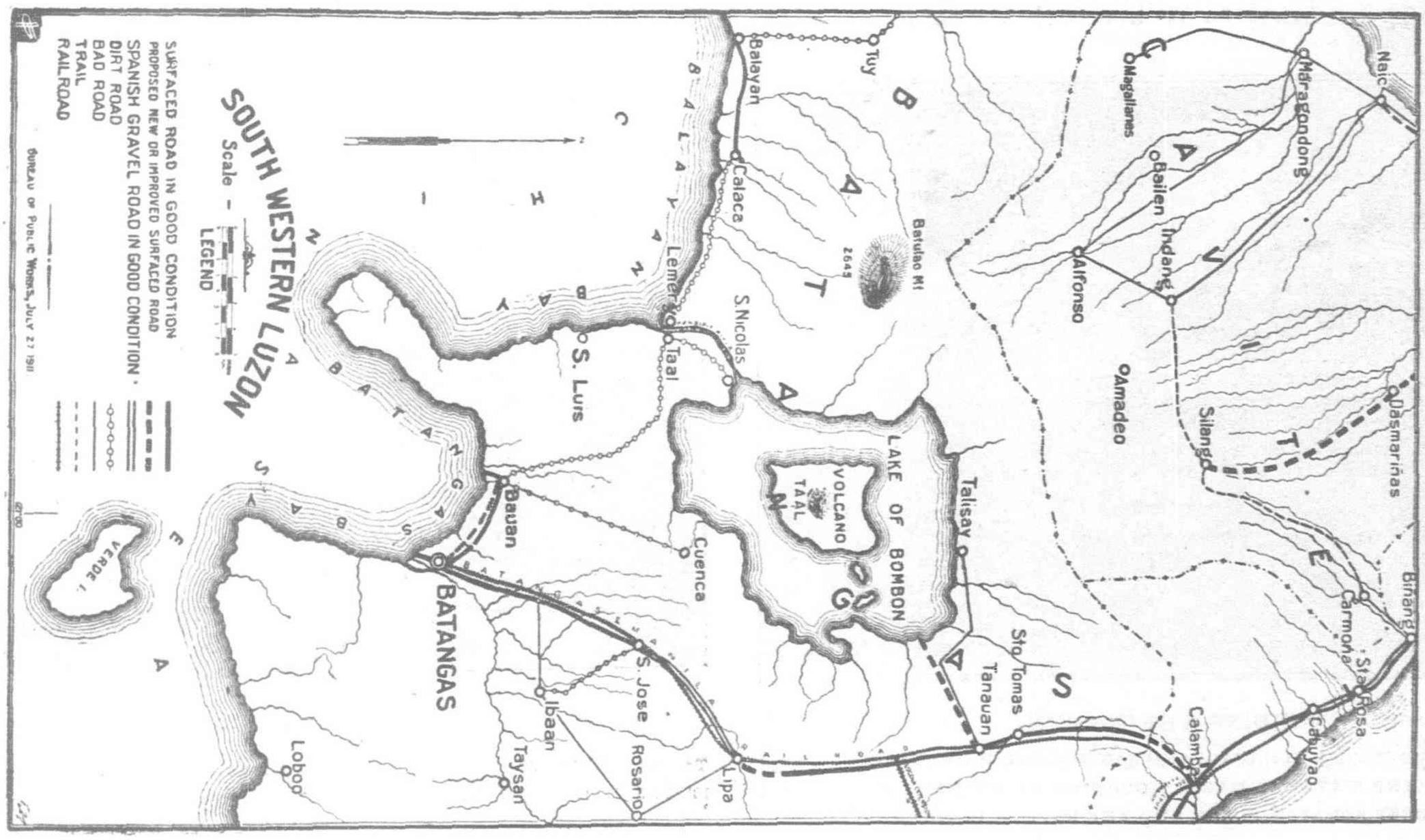


THE FERRY AT BALIUAG

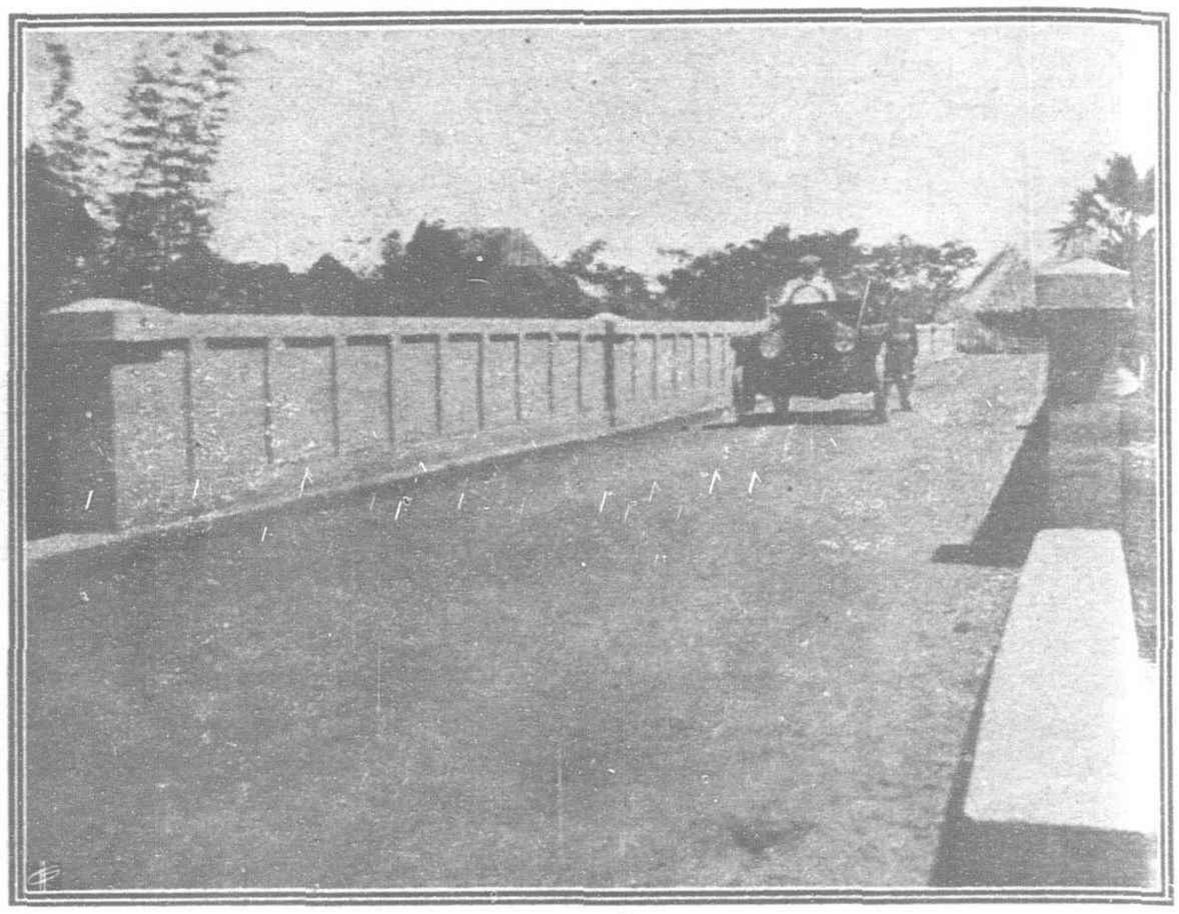


FORDING AN IRRIGATION DITCH

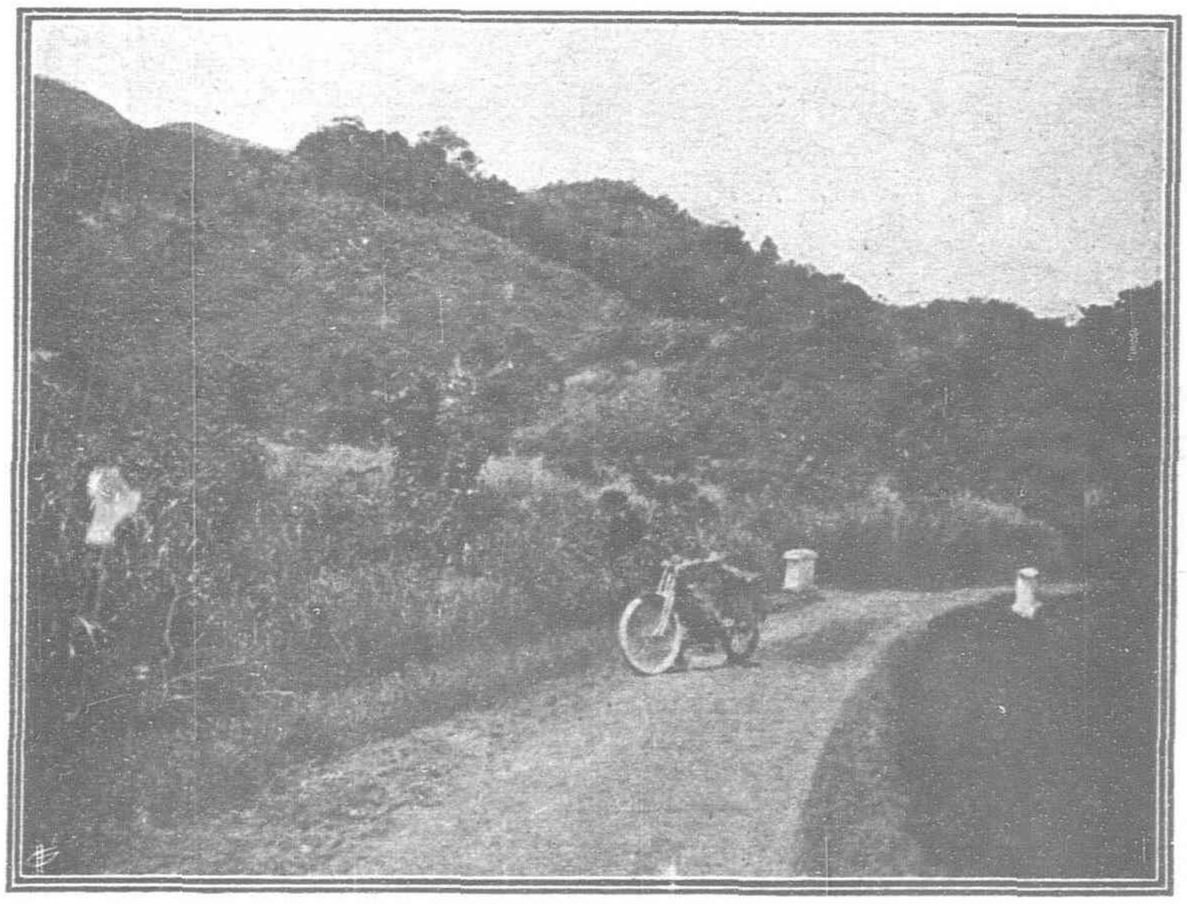
THE FAMOUS ZIG-ZAG ON THE BENGUET ROAD



THE OLD BRIDGES

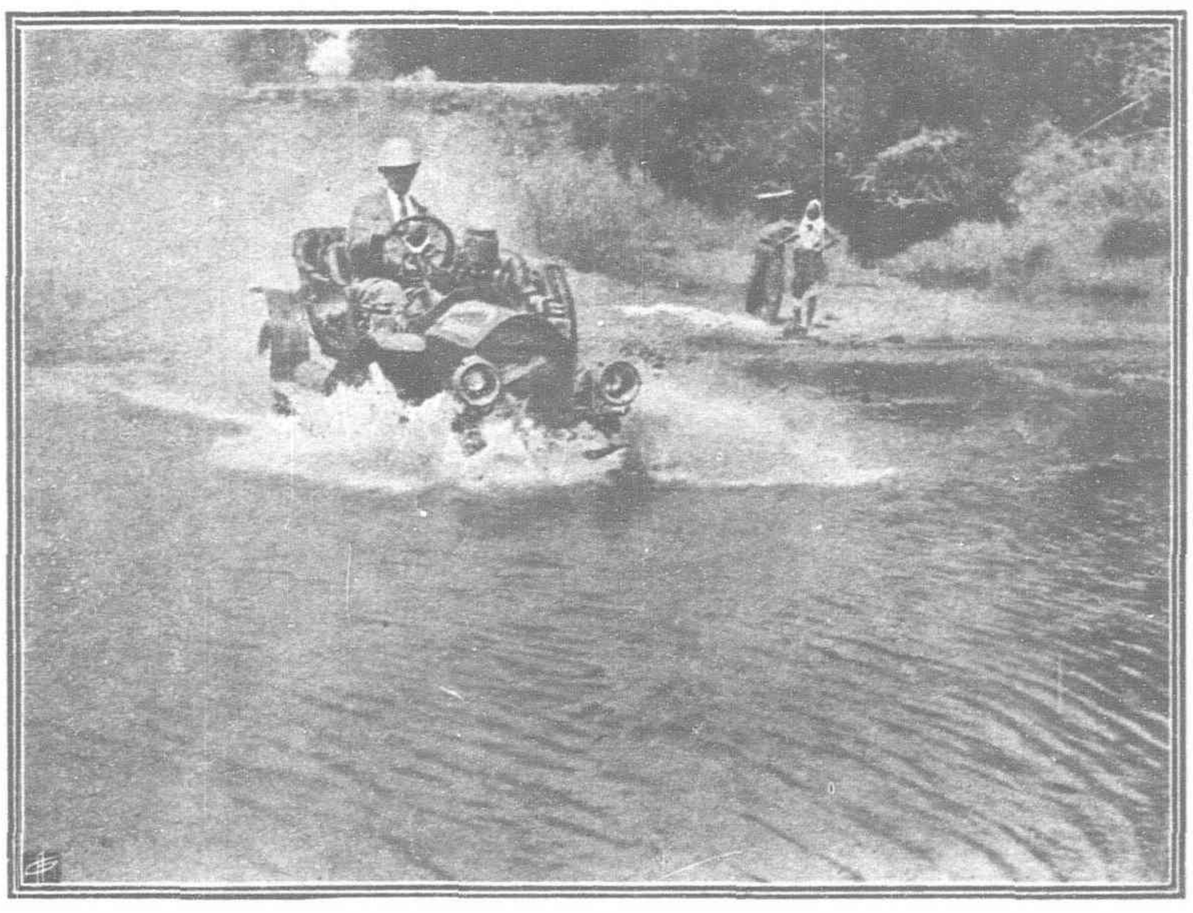


THE NEW BRIDGES



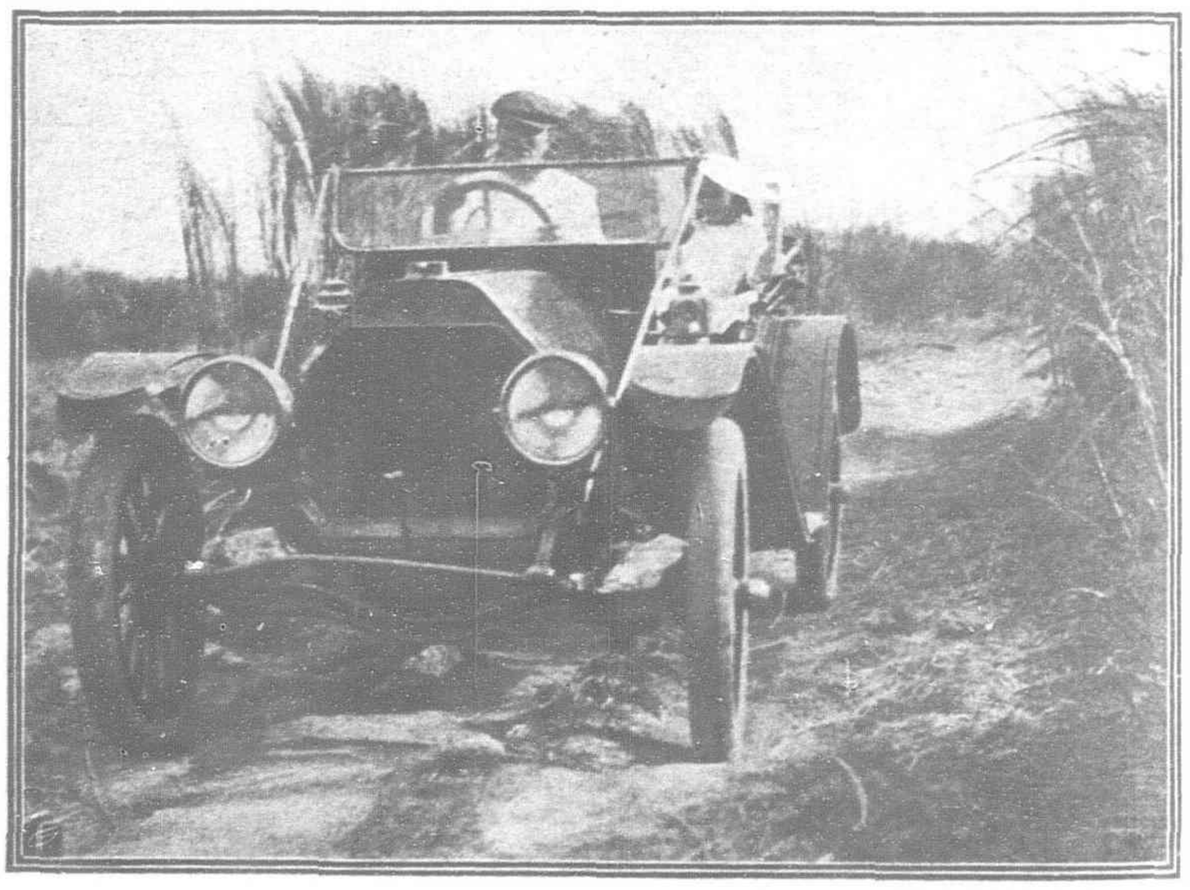
CALAMBA TO LOS BAÑOS

ON THE ANTIMONAN ROAD



FORDING THE MAASIM

THIS FORD IS BETWEEN BALIUAG AND SAN MIGUEL DE MAYUMO. IN THE DRY SEASON THE WATER IS HARDLY OVER EIGHT INCHES DEEP AT THE BEST FORDING PLACE AND THE BOTTOM IS HARD.



ON THE TRAIL

THIS PICTURE WAS TAKEN JUST SOUTH OF SAN MIGUEL DE MAYUMO WHEN IT WAS NECESSARY TO LEAVE THE MAIN ROAD ON ACCOUNT OF BRIDGE CONSTRUCTION.

THE FAR EASTERN REVIEW

GEO. BRONSON REA, M. E.
PUBLISHER
WILLIAM CROZIER, Editor.

COMMERCE :-: ENGINEERING :-: FINANCE

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and Advancement of Trade in the Philippines and Far Eastern Countries

PUBLICATION OFFICE:
MANILA, PHILIPPINE ISLANDS

CHINA OFFICE
Shanghai

GREAT BRITAIN:
SOLE ADVERTISING AGENTS
WALTER JUDD, LTD.
5 Queen Victoria Street, London, E. C.

SUBSCRIPTION AGENTS:

HONGKONG	KELLY & WALSH, LTD.
SINGAPORE	" " " "
YOKOHAMA	" " " "
SHANGHAI	" " " "
TIENTSIN	TIENTSIN PRESS, LTD.
WASHINGTON, D. C.	BRENTANO'S.

SUBSCRIPTION RATES: Philippines, United States, Canada, and Mexico, $2.50 U. S. C. per year. To all other countries in the Postal Union, $3.00 per year. Single copies 25 cents. U. S. C.

ADVERTISING RATES will be mailed on application.

Communications pertaining to the Editorial Department should be addressed to THE EDITOR.

ENTERED AT POST OFFICE, MANILA, P. I., AS SECOND CLASS MATTER.

MANILA, SHANGHAI, AND YOKOHAMA, MAY, 1912

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ENCOURAGING INTEREST IN IMPROVING HEMP MACHINERY

New Zealand has taken the initiative in encouraging mechanical effort in seeking new and improved machinery for the extraction and dressing of the fiber of New Zealand flax or hemp by a bonus of £12,000. The award will be made upon the approval of the New Zealand Hemp Millers' Association. New Zealand hemp (Phormium tenax) is entirely different from any other hemp plant and is indigenous to north and islands where it grows wild. The industry there has been greatly discouraged by the effective competition of Manila hemp which is stiffer and stronger and more durable for rope making while the New Zealand hemp produces a more flexible fiber and is better suited for twine, etc. According to Vice Consul General Henry D. Baker, five years ago, New Zealand hemp fiber brought £26 a ton, but the increasing competition of Manila hemp fiber has brought it down to about £17. It is for the purpose of reducing the cost of production which now averages about £14 a ton that the bounty has been proposed. The terms of the bonus require:

(1) A process of extracting and dressing the fiber of New Zealand hemp (*Phormium tenax*), whether by machinery or otherwise, whereby there shall be obtainable (*a*) a greatly improved quality of fiber marketable at a higher price, or (*b*) a substantial reduction in the cost of producing the fiber.

(2) Any such process that shall produce a fiber fit for use in manufactures other than rope and twine spinning.

(3) Any such process that shall render unnecessary any of the present operations involved in extracting and dressing the fiber, such as stripping, paddocking or scutching.

(4) Any improved method of separating the green envelope or the flinty or colored matter from the green leaf of the phormium plant so as to produce a strong white fiber the whole of which can be saved with little or no tow or waste.

(5) Any means whereby the by-products obtained during the processes of extracting and dressing New Zealand hemp fiber, such as the gum, dye stripper slips, tow dust, or waste vegetable matter shall be converted into a marketable commodity.

This proposal on the part of the New Zealand government is recognized by the U. S. Department of Agriculture as a step forward towards the solution of the problem of reducing the extraction of fiber by machinery and if successful would prove of interest to hemp growers in the Philippines. Prof. Lyster H. Dewey, fiber expert of the Department, is quoted as saying that "a machine that will successfully clean the fiber from the phormium leaves would probably do satisfactory work in preparing fiber from abaca in the Philippines. This bonus offered by the New Zealand Government may, therefore, aid our own fiber industries.

In the Philippines a number of hemp stripping machines more or less perfected have been invented and utilized in several districts. Up to date, however, while several of them have very admirable points to recommend them, none to our knowledge has been operated for any length of time as a commercial success, although there is every evidence that there is daylight ahead.

The character of the hemp growing areas, more or less inaccessible, the large expense necessary to transport the hemp stock comprising over 90% water to a heavy stationary machine in order to secure but 5% or less of fiber are among the difficulties that spelled failure commercially. If it were possible to construct a machine that could be easily moved require a minimum cost for labor attendance, and a capacity to make its operation profitable, there is reason to believe that a satisfactory process of extraction could be perfected.

A number of inventors claim to have a satisfactory process of extraction and have demonstrated that their machines are capable of producing marketable fiber, but there is doubt that the cost is less than by the old hand stripping process.

Experimenting with hemp extracting machinery in the Philippines has involved many thousands of dollars and there is little doubt but that lack of capital and of official encouragement is responsible for the failure to perfect a machine that would meet the varied conditions and prove a commercial success for the manufacturers and reduce the cost of production to the planters of the best grade of fiber.

It would seem that, in view of the enormous wealth in Manila hemp fiber, giving to the Philippines an exclusive industry, the bonus proposal of the New Zealand Government should find a duplication in Governmental activity in the archipelago.

Great credit is due the pioneer inventors of fiber extracting machines in the islands. They have worked faithfully and at great personal sacrifice. We have little doubt had the means been available and a substantial bonus offered by the Philippine Government the results by this time would not be disappointing.

THE AMERICAN BANK NOTE

The American bank note has established an enduring reputation for artistic quality of design and provides effectually against successful counterfeiting. From the days of Paul Revere who designed the first American bank note to the present time an enviable record has been made by American engravers inasmuch that the perfected bank note of today has invaded almost every section of the globe. The *New York Herald* publishes an interesting review of the history of the bank note. "Marco Polo," says that paper, "found bank notes in China ages ago, printed on paper made from the bark of the mulberry tree. One of the notes upon which the great Venetian traveller himself may have gazed is on exhibition at this day in the office of an American company. It is one of the series issued by the Ming dynasty about 1399 A. D.—'current anywhere under heaven'—and seems to have been printed from wooden blocks on a sheet of paper 9x13 inches— a bigger surface than any man could cover with both hands outstretched. It is good for one string of 'cash.'

"The provision against forgery is simple to the point of severity:—'Counterfeiters hereof will be executed. Persons having information of counterfeiters will be rewarded with taels 250, and in addition will receive the property belonging to the criminal.'

'Another great government placed much dependence upon death as a deterrent to imitators of its promises to pay. When Jacob Perkins, of Newburyport, Mass., invented the method of transferring designs from hardened steel plates to steel cylinders and retransferring to flat plates, thus enabling the engraver to devote the time necessary to accomplish his best work in the original and reproduce it at will, the new process aroused international interest.

"Mr Perkins and his associates went to London in 1819 at the instance of the British Minister at Washington to help the Bank of England issue notes not easily counterfeited. But the conservative old Bank refused to adopt the new method, preferring, as one of the Americans said, to rely upon the hangman rather than the engraver. Nevertheless, the English began in time to follow the American methods, after the geometric lathe had been invented by Asa Spencer, of New London, Conn., and improved by Cyrus Durand.

"The governments of Continental Europe depend exclusively upon color work to protect their paper currency, and several of the large banks of issue have civil engineers in charge of their bureau of engraving and printing, though what connection there may be between engineering and engraving is a mystery. Many Italian bank notes are easy to counterfeit. The Bank of Spain has of late abandoned its own plant, because its notes were imitated so successfully that counterfeits were accepted by the bank without question. A private concern now does the work. The Bank of Greece now uses the American method, having had sad experience with notes of Austrian, German and English fashioning.

"A myth that probably will never die tells us that the notes of the Bank of England cannot be counterfeited. As a matter of fact, they can be imitated readily enough, for little attempt is made to protect the notes beyond the use of a water mark paper. The water mark can be easily copied. A sensitized gelatine film soaked in cold water, after contact with an original water mark, will show every detail in clear relief. A thin film of copper deposited upon this forms the basis upon which a matrix in celluloid is made If a sheet of paper be pasted upon this matrix and rubbed with glass paper the exact water mark may be reproduced. Nevertheless the shadow of the hangman still seems to deter English counterfeiters.

"One practical safeguard of great effectiveness is the custom of the Bank of England to cancel every note that is returned to the Bank and issue another in its place. This and the practice of keeping a record of the number of all bank notes used in every business establishment keep alive a keen sense of responsibility which adds to security. The custom of circulating soiled bank notes, of course, gives the counterfeiter his best opportunity. Forgery is much more readily detected in a crisp, stiff, new bill than in a rumpled, dirty one. The United States government recently began to wash old notes, press them and restore them to circulation. Probably the process of evolution will lead us in time to depend upon the printing press rather than the laundry.

"The American style of bank note has become the standard in the countries of Central and South America. The experience of the Brazilian government led the way in this, after various disappointments. First the much vaunted Austrian system was tried, the notes being engraved and printed in England under that system. They proved a complete failure. Counterfeiters flourished. The Brazilians tried bank notes made in France, and these were promptly and extensively imitated as soon as the counterfeiters could get their plates and papers ready. Brazil tried German and English establishments, but still without securing protection to the bank note circulation, and at last turned to the United States and found a type of bills practically impossible to counterfeit."

The American Bank Note Company, of New York, with a business dating from 1795 and reorganized in 1879, occupies an unique position in its relations with foreign governments and corporations in that in its work it practically gives a guarantee against counterfeiting. This reputation has been won by continued experimentation by experts in the development of safeguards to meet every counterfeiting device.

THE MOTOR AND GOOD ROADS IN THE PHILIPPINES

(Continued from page 440.)

inaccessible. Pioneering excursions and endurance tests revealed the possibilities of a good roads campaign and the publicity given furthered the cause.

To-day Manila has automobile roads leading out to the provinces in almost every direction, one as far north as Baguio and another south to Batangas, the former a distance of about 200 miles and the latter about 75 miles.

The Philippines Motor Car Blue Book, published by Percy Warner Tinan of Manila, containing various maps, routes and other practical information for motorists, reveals a remarkable number of interesting trips with the promise of extensions that will make Manila one of the most popular motoring centers in the Orient. The photographs used in this brochure illustrate the difficulties met by pioneer motorists and the improvements during the last year. A number of them are reproduced here by courtesy of the publisher.

Among the trips of greatest interest are the Manila-Cavite, 19 miles; Manila-Santa Cruz, Cavite, 23 miles; Manila-Imus, 15 miles; Manila-Batangas, 71 miles with a side trip in the volcanic region of Taal of 30 miles; Manila-Antipolo, 14 miles; Manila-Montalban, 25 miles; Manila-Sibul-Cabanatuan, 91 miles and continuing on to Dagupan and Baguio. There are a number of side trips from different points on the above routes of great interest and, as the roads are developed, communication with the capital will be made easily available to districts now almost isolated.

FILIPINO LABOR IN THE PROVINCES

Great interest has been aroused by articles in the REVIEW on Filipino labor throughout the provinces and more evidence of the efficiency of the laborer as he develops under competent supervision has been subscribed by lumbermen and agriculturalists who owe their success to the manner in which they have perfected their organizations from the material at hand. Among those who are free in expressing their appreciation is Ex-Governor A. U. Betts formerly executive of Albay province. Mr. Betts has made his home for the last decade in Albay engaged in farming and lumbering. In the initial stages he found many difficulties to surmount but as he familiarized himself with conditions and local customs, he soon worked out a solution to every problem. Today he employs from 300 to 700 men daily getting out timber and about 100 families on his hemp plantation. Governor Betts says:

"On my timber concession on Rapo Rapo Island I believe I have developed an organization of from 300 to 700 men as efficient as any in the Orient. When I first started to use Filipino labor I paid at the rate of 80 centavos a day. The force as a rule had little experience in the woods and the few who had been formerly engaged in that kind of work used very crude methods with the result that they did not earn the wages paid. I soon inaugurated a system of paying by the piece. I supplied all the tools and equipment. They worked in gangs and were paid promptly upon delivery of the timber to the wharf. They were somewhat suspicious of the new arrangement at first but as they became more familiar with the work and the advantage of good tools their efficiency increased. In three months the individual output was doubled and the daily amount paid per man increased to ₱1.50 and upward in some instances to ₱2.50, while the unit cost to me was greatly reduced. Competition between the gangs is very keen I offer nine weekly premiums as rewards for the greatest number of cubic feet of the three different groups of timber with first, second and third prize in each and I find a remarkable response in this appeal to their pride, while it is developing very competent laborers and splendid team work.

With each gang I send a capataz who selects the timber and otherwise looks after my interests. These men are paid by the month. I have several high school graduates and I must say that their knowledge of English makes them more valuable as supervisors than those who have no knowledge of English.

"I make it a rule to make no advances to the men. They are paid for their timber in cash and can purchase from my supply store if they wish. I keep everything in stock and sell at from fifteen to twenty per cent lower than the neighboring stores. Outsiders purchasing are not given this reduction, so that employment with me means preferential treatment and a large saving in cost of supplies. At first it was difficult for the men to appreciate the advantage of doing business on a cash basis but this was overcome with a little patience. The absence of a long debit account and a balance in the savings bank instead of the old time hopeless peonage which prevailed in that section, soon made its appeal. Instead of discouraged, starved laborers, I now have robust workers, who have comfortable homes, are ambitious, and have become capitalists in a small way.

"I furnish free medical treatment for the men and their families and supply the timber for the construction of the employees' homes. This together with supplies at more reasonable prices than at outside stores, reduces the cost of living so materially that it is rare to find one of the laborers without a handsome balance in the post office savings bank.

"I am satisfied that these favorable conditions of employment make an appeal to the Filipino. Free from debt, with a comfortable home and a measure of return consistent with the effort put forth, and trained under competent supervisors, no Oriental is more desirable as a laborer."

INTRODUCING AMERICAN GOODS ABROAD

In the interests of American trade in Malaysia Vice-Consul General D. Milton Figart at Singapore has been investigating trade conditions and the best methods to employ of introducing American manufactures. He propounded several questions to a number of American businessmen in the Straits Settlements as follows:

"Which of the following six methods of introducing American manufactures do you consider the most practicable for application to this district? (1) Correspondence. (2) Placing exclusive agencies with local houses by correspondence. (3) Doing business through general export houses of New York, San Francisco, etc., which send their own representatives abroad, handling perhaps several hundred different lines. (4) Traveling salesmen belonging to the firm itself, but whose authority is limited to placing agencies with local houses. (5) Establishment of a general import agency for American goods only by some commercial organization, such as a chamber of commerce or a bureau of manufacturers. (6) Establishment of an agency on the spot with a trained personal representative in charge."

"As to the first question, one was of the opinion that staple articles which the public demands and of which the United States is the best producer could be satisfactorily introduced in this manner, while the majority considered that success resulting from correspondence is too insignificant to be mentioned. Singapore houses will not accept foreign goods in large quantities when their only source of information regarding these articles is through correspondence and catalogues. Furthermore, such a method presents no inducements for a seller to take up lines with which he is unfamiliar and which would tend to displace other lines in which he has long dealt more or less successfully.

"With regard to the second question, practically the same opinion is expressed. It was further noted that although little difficulty perhaps is experienced in establishing an agency with local houses through correspondence, the difficulty arises in having the sale of the American product pushed.

"It was claimed that certain foreign dealers sell American goods grudgingly, being forced to handle certain lines on account of the demand, and reference was especially made to American shoes, about which some complaint was registered as to inability to keep stock evenly sorted up. This, however, is partly the fault of the American manufacturer who fails to execute orders promptly, as, it was stated, a certain size and style of American shoe might be purchased to-day, but no assurance that the order would be duplicated three months hence could be given.

"Moreover, it was further suggested that ordering through importing firms was undesirable on account of the fact that Straits firms are much intermixed through limited liability companies whose share holders may be interested in half a dozen houses, and consequently lines which might formerly be exclusive might become, after the agency was placed in local hands, the common property of competitors.

"There is a concensus of opinion that the third method will be successful in direct ratio to the number of visits made by the traveling salesmen.

"With regard to the fourth method, opinion seems to be indefinite. Good results are predicted, provided the article introduced is indisputably superior to competitive articles of foreign manufacture.

"As to the fifth, opinion differs, being about equally divided between appproval and disapproval. The main objection set forth seems

to be the inability to secure a proper representative, but this fact alone would not warrant the abandonment of the general proposition, for the reason that export houses as mentioned in the third question have the same difficulty to overcome. They can experience no success unless they secure a man who is able intelligently to represent the various lines for which the house holds agencies.

"This proposition, however, seems to the writer to be the most practicable in lines for which a large sale might be anticipated, such as hardware, leather goods, the simpler farming implements, motor cars, motor cycles, bicycles (of which many are used), etc. Such a general agency could be established by an enterprising American who is more or less familiar with local conditions, and he could obtain locally the services of an assistant who spoke the language of the country and who had traveled throughout the district. Again, the question arises as to whether such a man could be found, but the writer is personally aware of several such men at the present time whose services could be obtained and who would prove efficient.

"The cost of opening such an agency, moreover, is not prohibitive. Every manufacturer who places the selling agency of his goods in the hands of a general export house pays annually a certain sum, and by diverting the money spent in this way, and investing it in the district where he hopes to dispose of his products, it seems reasonable to expect that better results will be obtained. There are, however, many different opinions on the subject. Referring more particularly to Singapore as the ideal center for such an agency, attention might be invited to the accessibility of surrounding countries, such as Ceylon, India, Burma, Netherlands, East Indies, Siam, and Cochin China, to all of which periodical visits could be profitably made.

"The advisability of adopting the sixth method would of course depend upon the demands which could be created for the American product, and such a course should be determined by the manufacturer. It should be noted in this connection, however, that with very few exceptions no such agencies have been established in the Straits Settlements, the bulk of the import trade being done through general export houses of the kind already described. It would seem inconsistent, however, to say that success could not be obtained by an American agency, when British, German, Dutch, and firms of other nationalities have been so eminently successful. On this last subject one man expresses himself in the following terms:

"'To the proposition of establishing a general import agency for American goods exclusively, to be run absolutely independently as an American concern, I most emphatically say no; but form a general import agency for American goods only and let that agency establish itself in one of the local British mercantile houses, in order that it may do business under the established name of that house; send out a trained representative to manage the business; keep a separate set of books (open to the inspection of the British house), and, in fact, run everything independently of the British concern. In other words, simply rent a section of their office and warehouse and do all business under their name, allowing them for the privilege an equitable commission on all business done."

"Close attention should always be given to packing and shipping. One excellent line of American goods for which a considerable demand was created in this district has been practically abandoned because of the ruined condition in which the product arrived, due to poor packing. This seems, however, to be more or less of an exception, for the general rule is that American goods coming to Singapore are well packed.

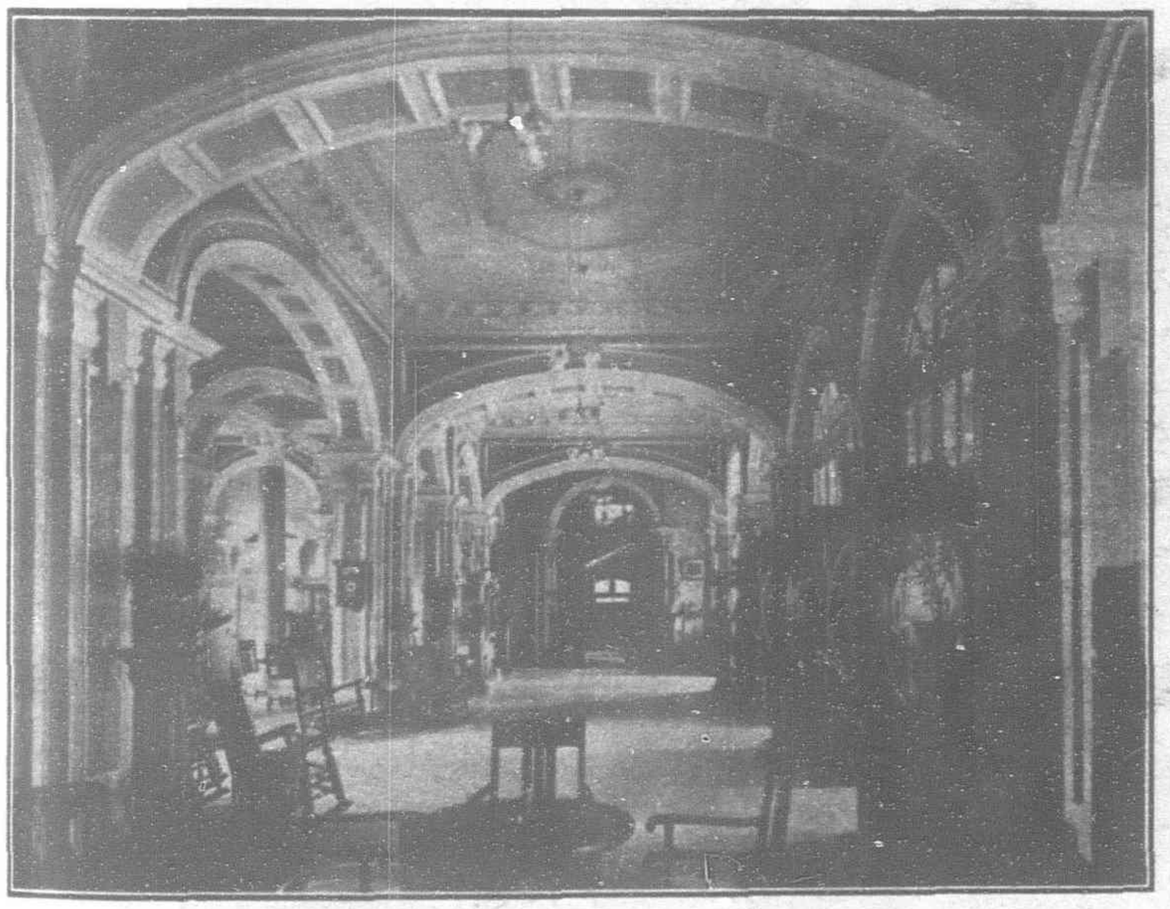
"Another great difficulty being constantly experienced is inability of the local agencies to secure prompt shipments. Orders are placed in proper time, but are not executed for six months or a year. There can be no excuse for such negligence, and American firms which are not willing to keep their foreign agencies supplied with sufficient stock should promptly abandon the export trade and not prejudice foreigners against American products. In general, too much emphasis can not be laid on this feature, as scarcely a day passes without a recurrence of the complaint.

SHANGHAI'S NEW BUILDINGS

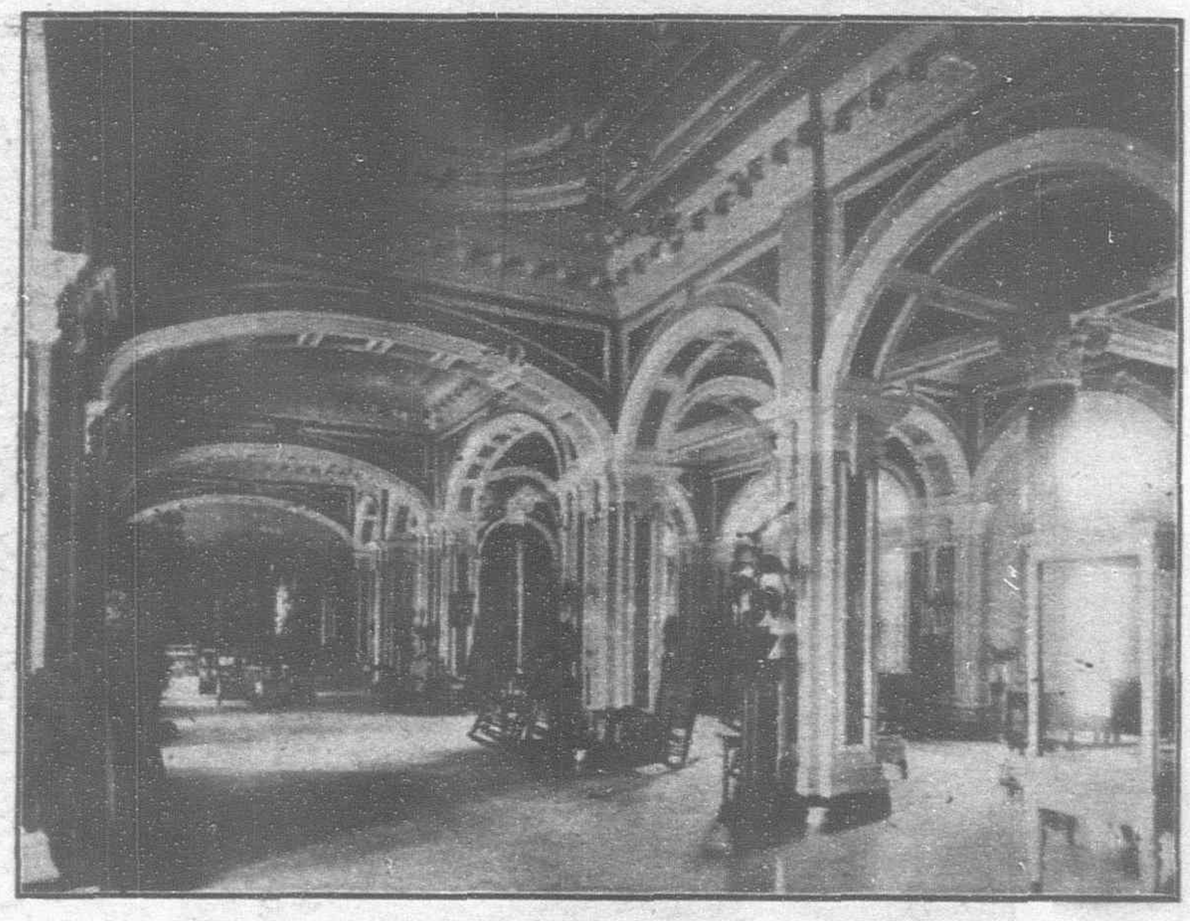
THE ASTOR HOUSE HOTEL

The magnificent building occupied by the Astor House is the pride of Shanghai and the appointments of the hotel are not excelled in the Orient. The opening of the New Astor House Extension in January last year was the subject of much congratulatory local comment and with justice as visitors to Shanghai freely subscribe.

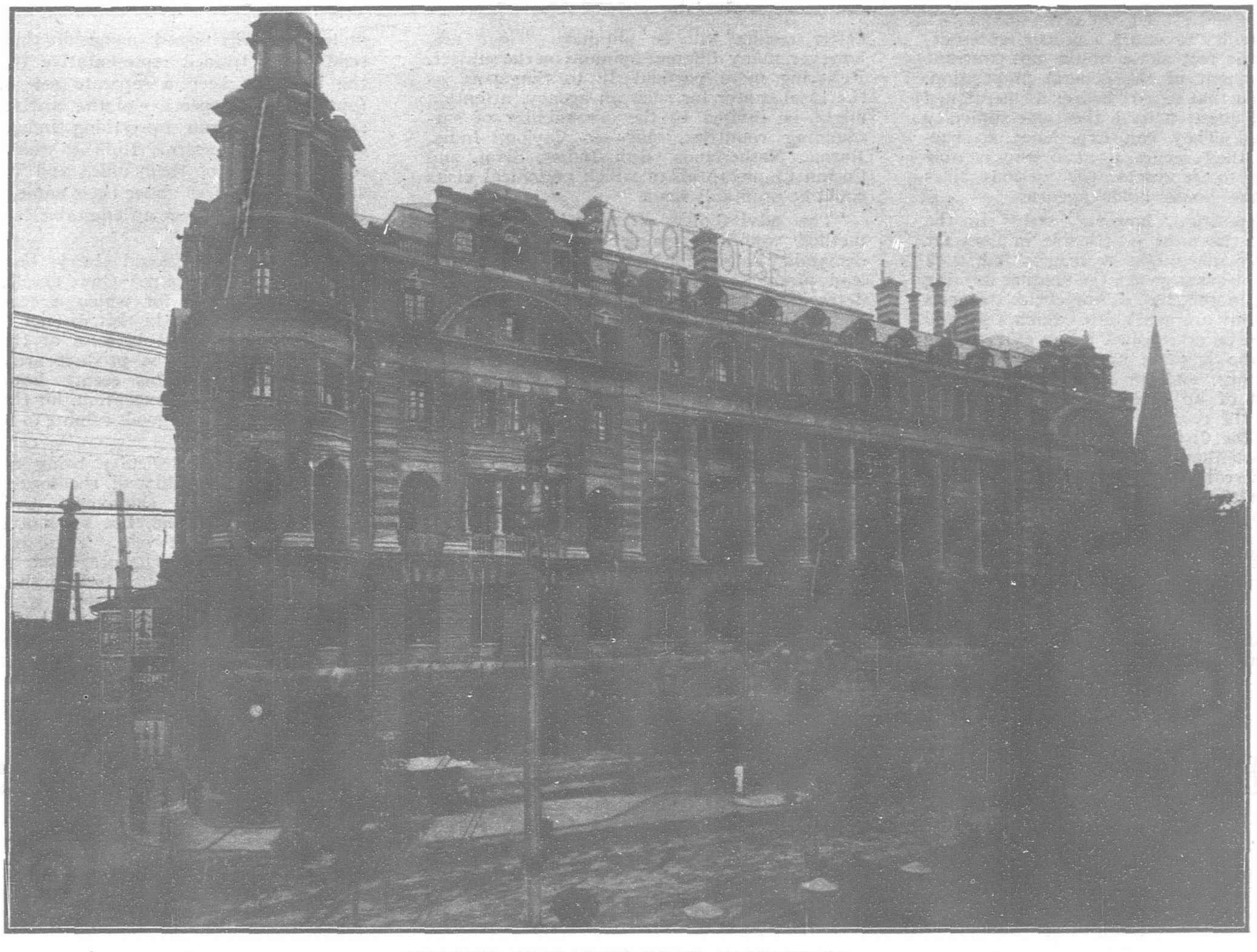
The hotel extension was designed by Messrs. Davies & Thomas, architects, and constructed under their supervision. The Renaissance style of architecture prevails. The southern frontage overlooks the Huangpu River and the Public Gardens, one of the most attractive and desirable sites in the city. It has a five storey frontage on the Whangpoo Road with attics, and four storeys on the Astor Road side. On the ground floor, at the corner of Whangpoo Road and Broadway, is a handsome buffet and bar 59 ft. by 51 ft.; in the center, with main entrance from Whangpoo Road, is a lounge hall, 70 ft. by 60 ft., and at the East end are the Hotel office, the manager's office, and the secretary's office, in mezzanine, above the latter. The basement fronting Astor Road contains store-rooms, steam-heating apparatus, and motor fire-pump. The grand staircase, with marble dado and red panels on white background, leads from the lounge hall to the ground floor above the basement—five feet above the level of the lounge hall—and here, with frontage to Astor Road, are found the passenger lifts, ladies' cloak room; a furnished ladies' sitting-room; a reading room, furnished with two large reading tables, three writing desks, and several comfortable sofas and easy chairs upholstered in leather; a private buffet, fitted with a quadrant-shaped bar of polished teak-wood; and a large and well-lighted billiard room, containing two full-sized tables and ample seating accommodation, and with lavatory adjoining. On the opposite side of a wide corridor which overlooks the Hotel quadrangle are the hairdresser's shop and a small and well-secluded writing-room. To this floor there is also a ladies' entrance and staircase from the Astor Road. Up the grand staircase, on the first floor, with frontage to Whangpoo Road and extending almost the whole length of the building, is the main dining-hall, with large and well-appointed service rooms adjoining. The hall is 154 ft. by 49 ft. and two storeys in height, with gallery and verandah on the second floor and well lighted by a barrelled ceiling of glass in the day-time and by innumerable electric lights, totalling 6,000 candle power, by night. To add to the convenience of the guests, there are separate service rooms on the second floor for dinners to be served in the gallery and on the verandah. On the East side of the first floor, with outlook on to Astor Road, is a handsome banqueting hall, 91 ft. by 40 ft., with a reception room for same 40 ft. by 20 ft., both decorated in ivory white and gold. On the West side of a wide corridor, with outlook



ASTOR HOUSE HOTEL LOBBY: LOOKING TOWARDS STAIRCASE

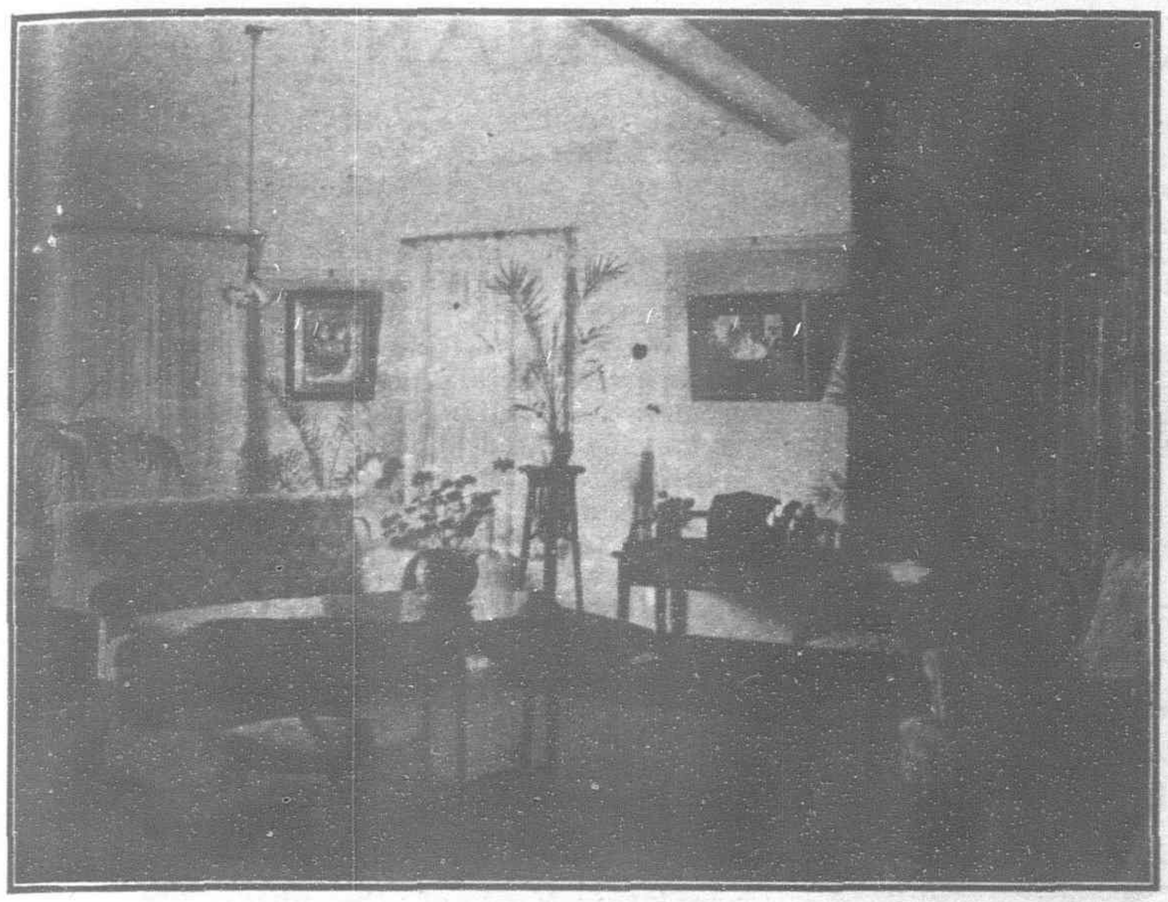


ASTOR HOUSE HOTEL LOBBY



THE NEW ASTOR HOUSE HOTEL AT SHANGHAI

ASTOR HOUSE HOTEL: MAIN DINING HALL



ASTOR HOUSE HOTEL: A PRIVATE SUITE DRAWING ROOM

BED ROOM

on to the quadrangle, are six private dining-rooms, conveniently partitioned off by means of cleverly contrived folding doors, and also the service rooms and pantries. At the northern end of this and from all the main corridors, access is gained to the fire escape, which consists of an unusually wide and solidly built iron stair-case, and in every corridor there are to be found serviceable hydrants and fire hose.

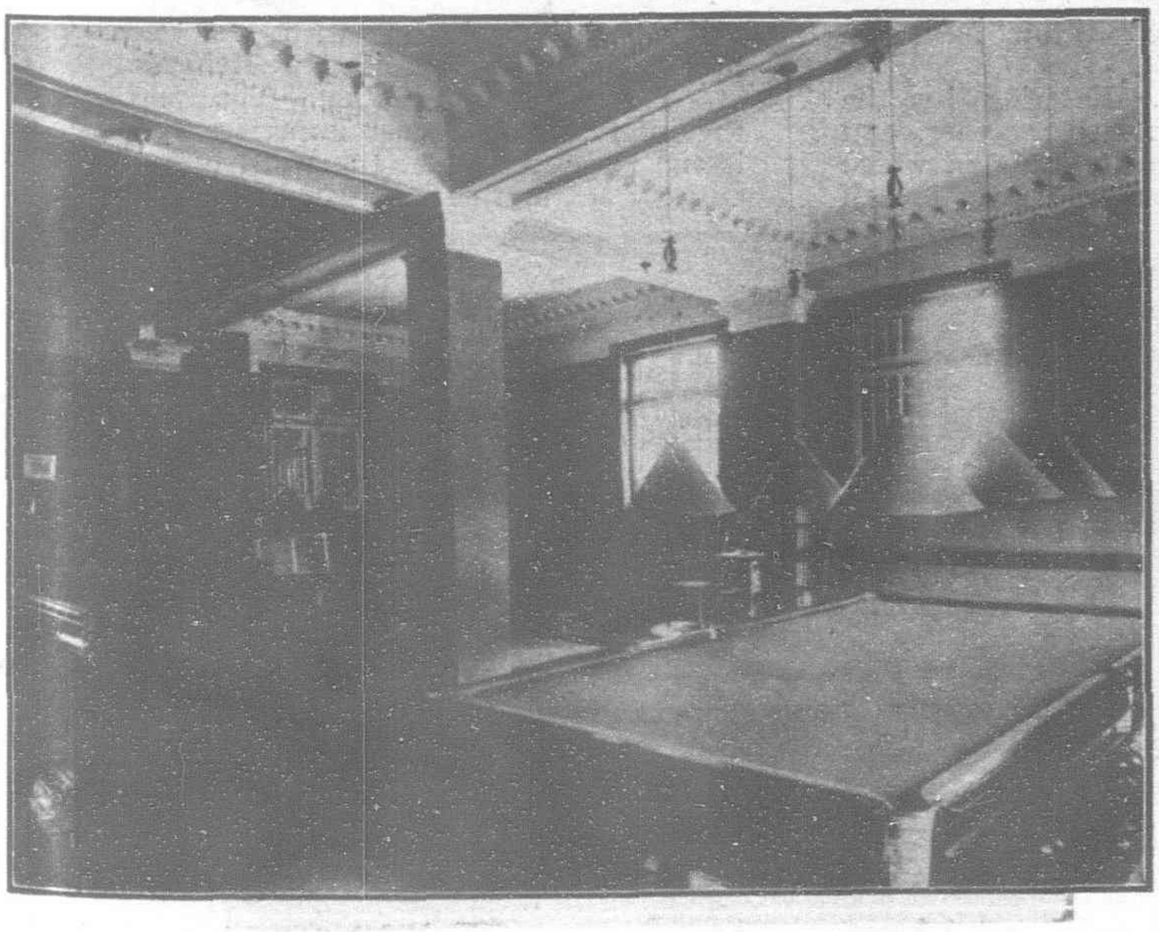
On the second floor, in addition to the gallery of the dining-hall and its service rooms, there are on the East side of building a number of comfortably furnished bedrooms, access to which is obtained through a large glass-roofed and galleried court, which can readily be converted into a winter garden. The bedrooms are furnished in most modern style and each has a particularly roomy and well-fitted bathroom attached, with hot and cold water laid on. The third and fourth floors are given up entirely to bedrooms, private sitting rooms and staff rooms, and here there are some particularly luxurious suites, notably one on each floor situated at the south-western corner of the building and from which a magnificent view of the Settlements and the surrounding country can be obtained.

The attic storey contains the kitchen, sculleries and store-rooms, etc., all admirably suited for their purpose, and these are connected with the service rooms of the dining and banqueting halls by means of six electric service elevators.

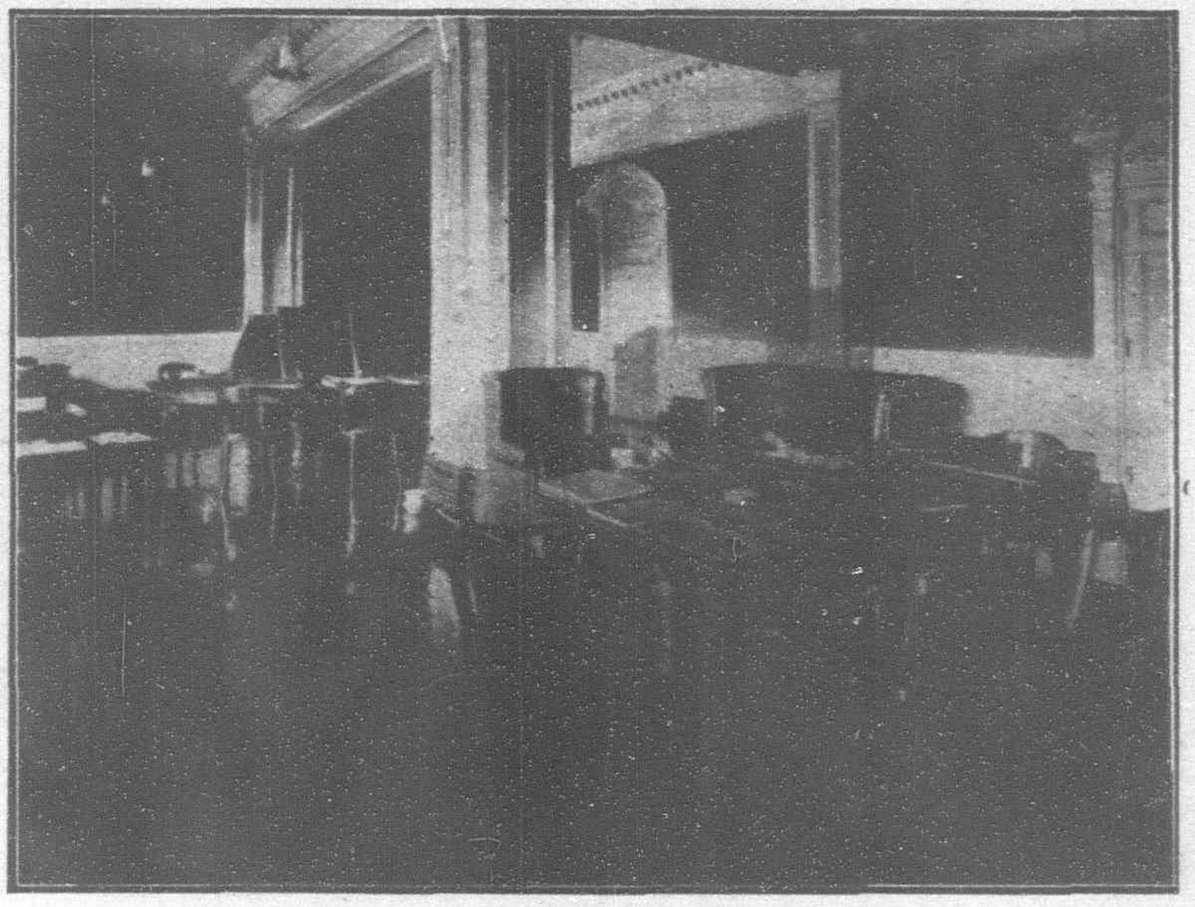
The electric passenger elevators, together with the six electric service elevators of the push-button type were supplied and erected by Messrs Brighten, Malcolm and King, Ld. The passengers' elevators serve five levels and are of Messrs. Waygood & Co.'s latest design. These elevators will lift 14 cwt. at a speed of 200 ft. per minute, but to prevent the unpleasantness of violent starting and stopping, they are fitted with a second speed. Beneath each cage is fitted with Waygood's special passenger safety gear, which consist of four-grooved cams, so that undue stretching or breakage of one of the ropes will cause the cams to grip the timber backing behind the steel guides and prevent further descent. These elevators are further equipped with Waygood's patent slack cable switch, arranged to cut off the electric current and stop the machine should either the cage or balance weight meet with obstruction in either direction. They are also fitted with electro-mechanical brakes which come into action directly the electric current is shut off from the motor. To prevent over-running at either extreme end of the well they are equipped with main over-run limit switches, which are actuated by the travel of the cages to break the main electric circuit, to cut off the electric current and stop the elevator. So as to prevent accidents, the collapsible steel gates, fitted on each floor, are equipped with electrical locking gear, so that the elevators cannot be started until all the gates are closed. The six service elevators are fitted with full automatic push-button control, operated from the fifth floor, so that the elevator can be dispatched to either floor and recalled on a given signal. They are fitted with special safety stop-buttons, which stop the elevators at any point desired.

Messrs. Scott, Harding and Co., carried out the electric light and bell installations from the plans of Mr. S. S. Sellick retained by the hotel company as consulting electrical engineer, and with materials manufactured by The British Insulated and Helsby Cables, Ld. The electric light fittings were supplied by Messrs. Arnhold, Karberg and Co. The Shanghai Waterworks Co., Ld., made the hot and cold water installation; the Shanghai Dock and Engineering Co., Ld., installed the low-pressure steam-heating apparatus; the decorations to the lounge hall and bar are the work of Arts and Crafts, Ld., and those to the rooms on the ground floor of the East wing and to the dining-hall are by Weeks and Co., Ld., while other furniture was supplied by Messrs. Tai Cheong and Co. and Va Nel and Co., and the terazzo floors in the hall and public bar, etc., were carried out by Messrs. Stolz and Kind.

A very comprehensive system of electric "Synchronome" clocks was installed by Messrs. Samuel and Co., Ld., as agents for the Synchronome Co., of London. This system is worked from one master clock fixed in the manager's office and on the principle by which an impulse from the master clock is made to actuate the dependent mechanism in the other clocks of the Hotel every half-minute. The master clock itself receives its motion from an electric impulse once in every thirty seconds and then only for from one-fiftieth to one-twentieth of a second according to the number of clocks in the circuit.



ASTOR HOUSE HOTEL: BILLIARD ROOM



ASTOR HOUSE HOTEL: READING ROOM

CHINA MUTUAL LIFE INSURANCE COMPANY, LTD.

The headquarters of the China Mutual Life Insurance Company, Shanghai, is one of the most attractive buildings in Shanghai.

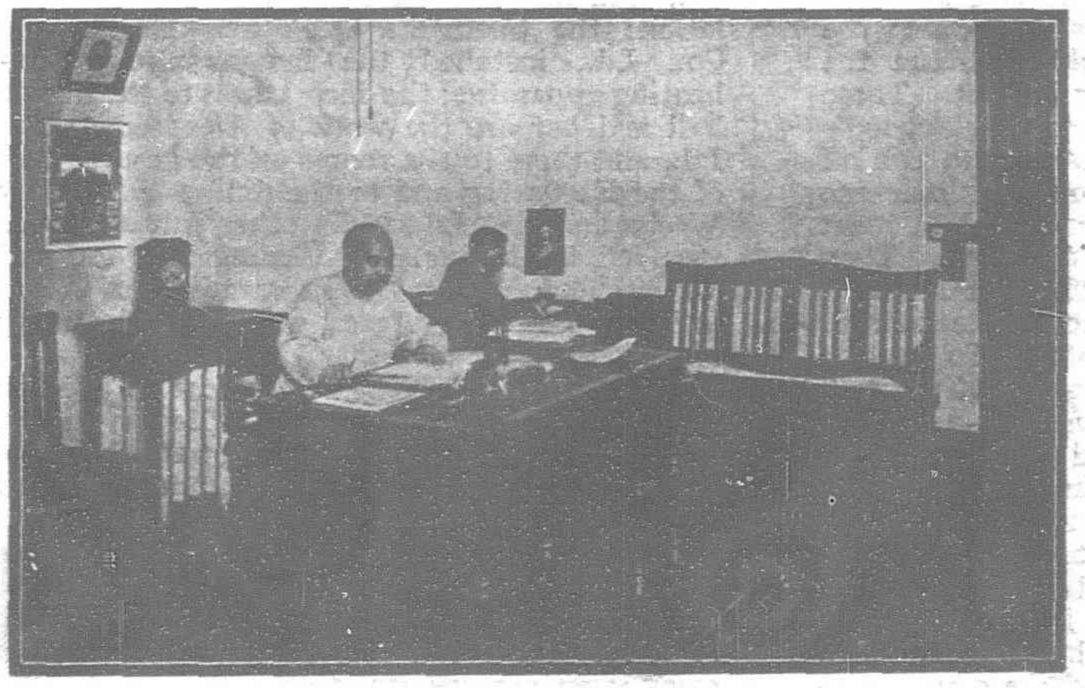
The style is a free treatment of English Renaissance; an Ionic architectural order; consisting of plinth, base, columns and cornice, etc., occupying the entire height from first floor to the top of the building. The heavy projections, and the boldness of these features, contribute largely to the impression of "solidity" which is the first and lasting impression produced on one. The entire walls are of Tsingtao granite, the fine polish of the columns contrasting well with the hammer-dressed surface of the remainder. Over the main entrance are two seated figures in white statuary marble allegorically representing Prudence and Abundance.

The building occupies a commanding site on Canton Road a stone's throw from the Bund.

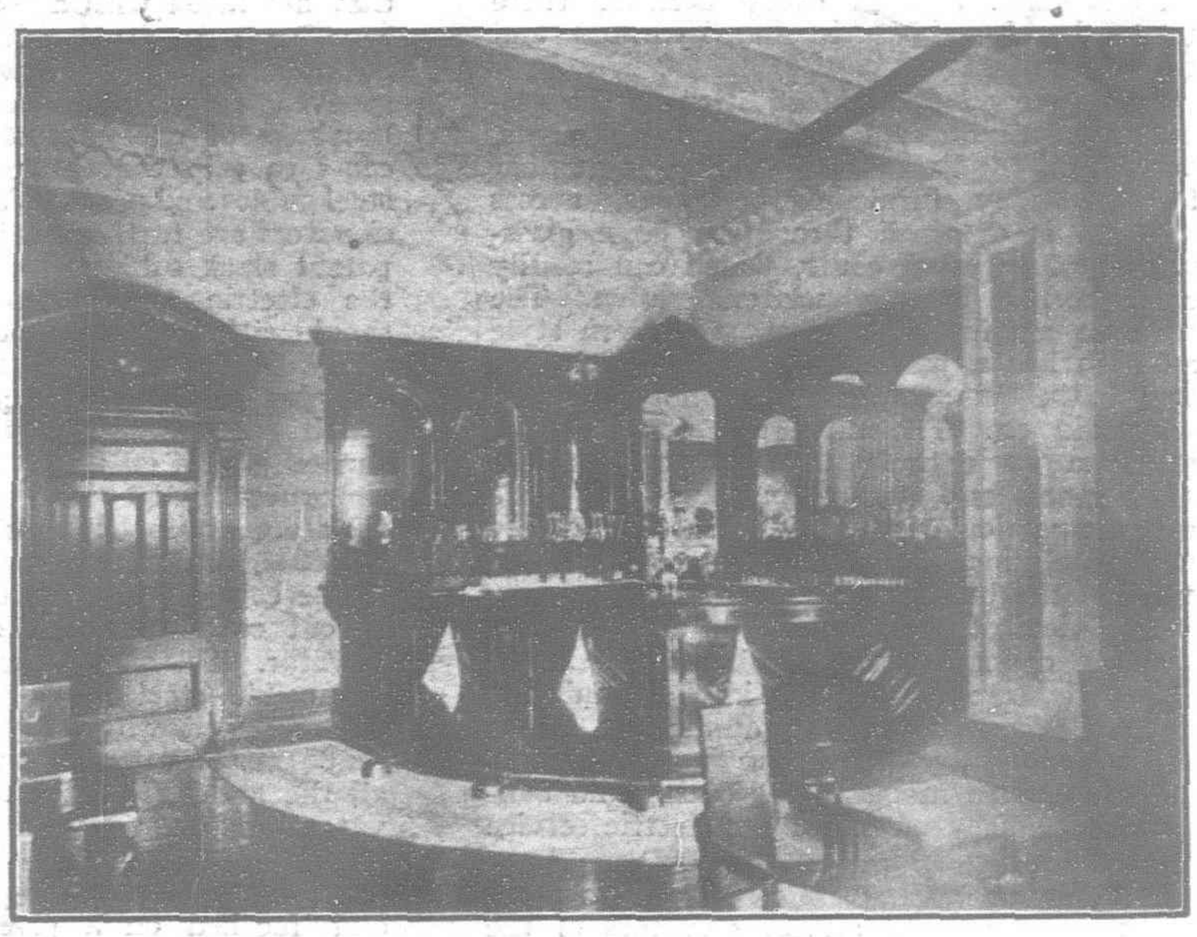
"CHINA MUTUAL" BUILDING—SUPPLY DEPARTMENT.

THE GENERAL OFFICE.—Entering by the main doorway on the north-east corner, and passing through a spacious vestibule, of which more will be said later on, one finds oneself in the public space of the Company's general office. This is divided from the extensive floor space devoted to the desks of the general staff by a substantial counter and polished brass grilles. The manager's and secretary's offices open to the left hand. They are spacious and lofty rooms, panelled with teak, with handsome mantels and overdoors and replete with every detail tending towards efficient administration. In order to avoid repetition, it may be stated at the outset that the floors, skirtings, and the entire joinery work and furnishing of all the offices are carried out in Burmah teak. On this floor are also situated a public waiting-room, the actuary's office and special quarters for the native shroffs, whose duty it is to attend to the local collection of premiums.

Supporting the heavily-panelled ceiling of the general office are eighteen columns and wall pilasters of red antique marble, having capitals and bases of white statuary marble. The central portion of the ceiling is occupied by a lofty dome having powerful extracting ventilating fans at the apex. The entire dome is lined internally with stained glass, the designing and carrying out of which was entrusted to Messrs. R. E. Pearce & Company of London. As will be seen by the accompanying illustration, the dome is divided into sixteen principal panels, representing the Virtues—TRUTH, WISDOM, PRUDENCE, COURAGE, PROSPERITY, KNOWLEDGE, PERSEVERANCE, MERCY, JUSTICE, DISCRETION, HOPE, CHARITY, FAITH, FORTITUDE, PEACE, INDUSTRY.



GENERAL AGENT'S OFFICE

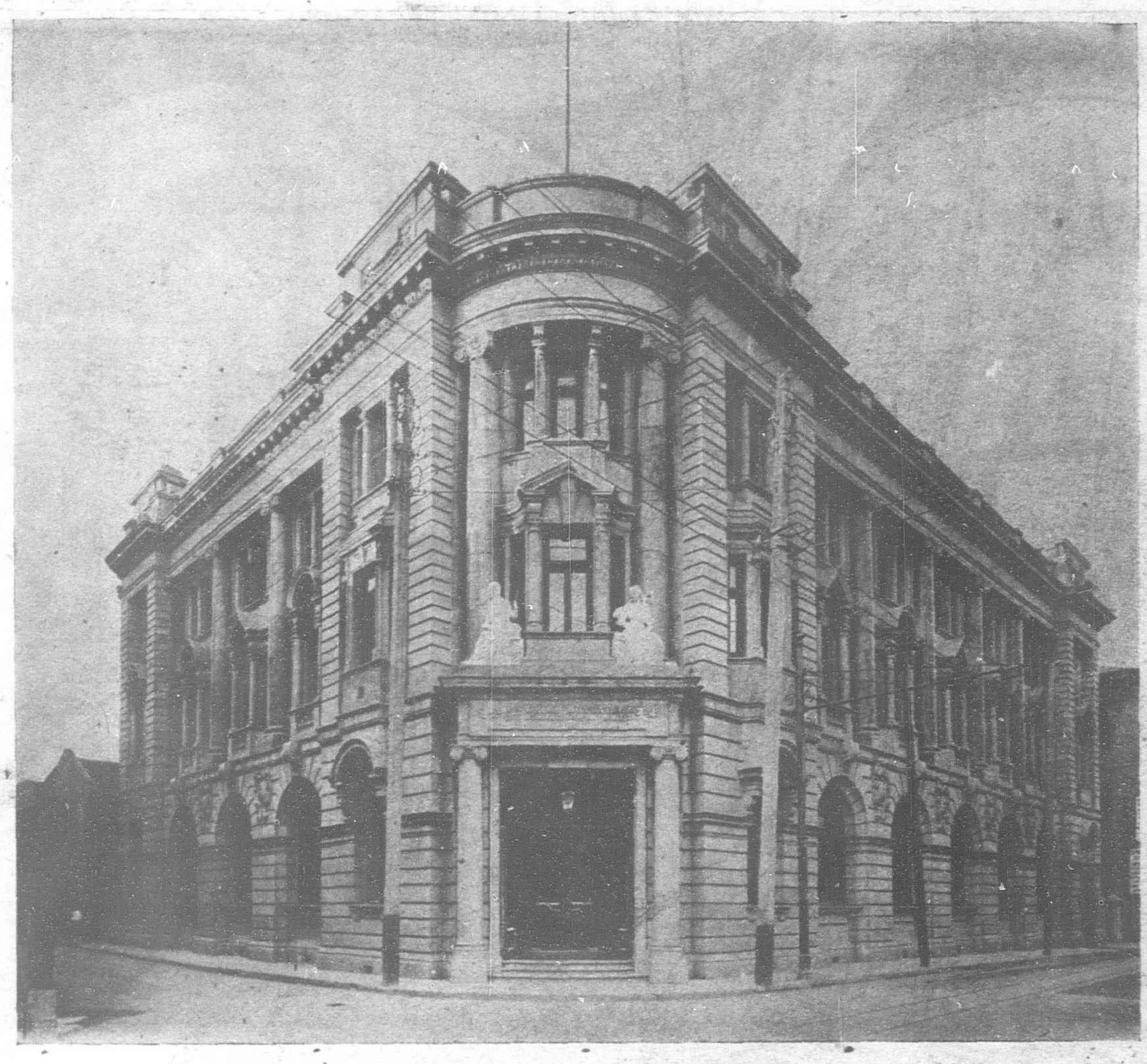


ASTOR HOUSE HOTEL BAR

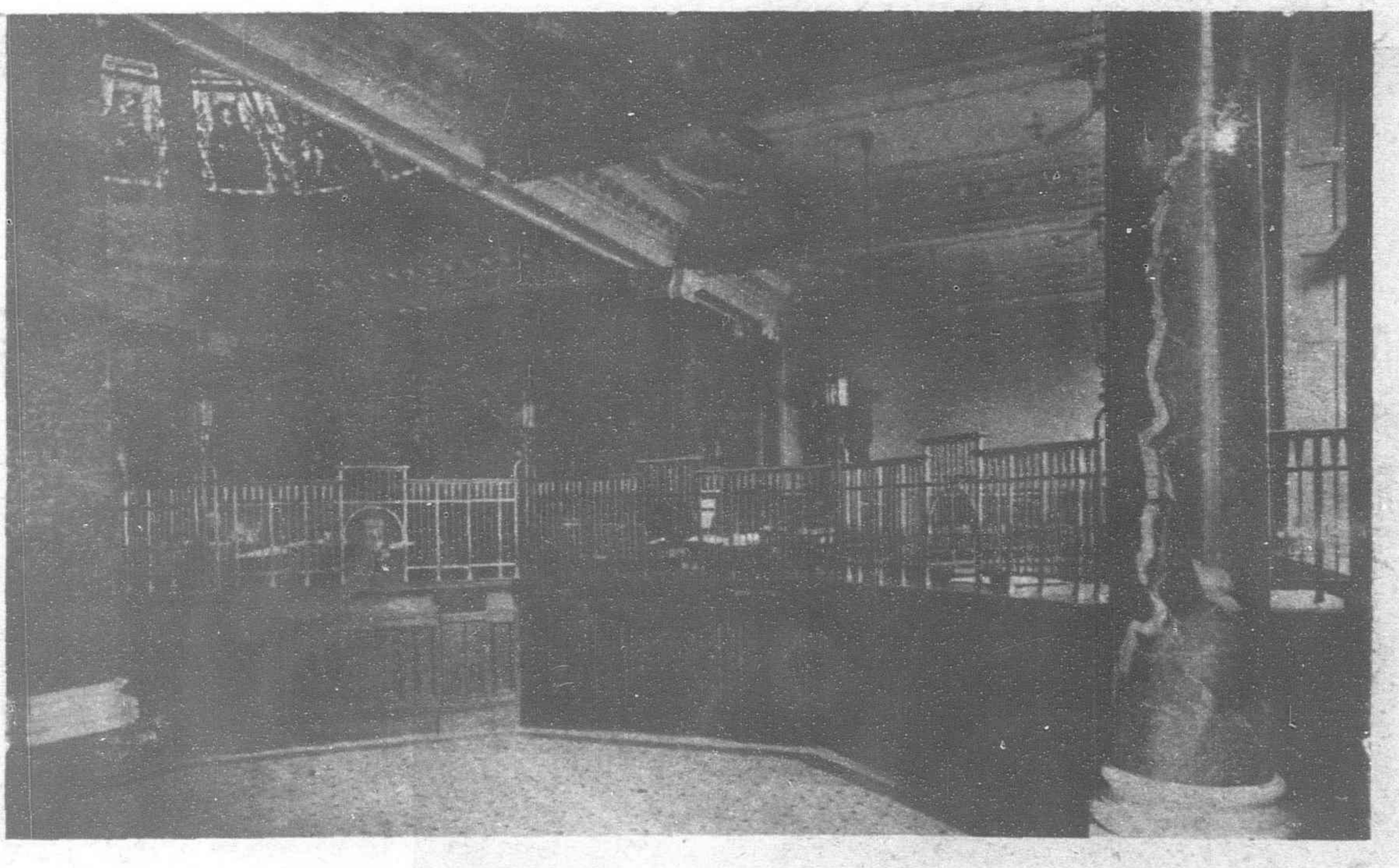
THE MAIN VESTIBULE.—The portion of the interior which most impresses the visitor is the main vestibule, the walls of which are entirely of marble encrusted in the Italian

SUPERINTENDENT OF AGENCIES' OFFICE

SHANGHAI AGENCY'S OFFICE



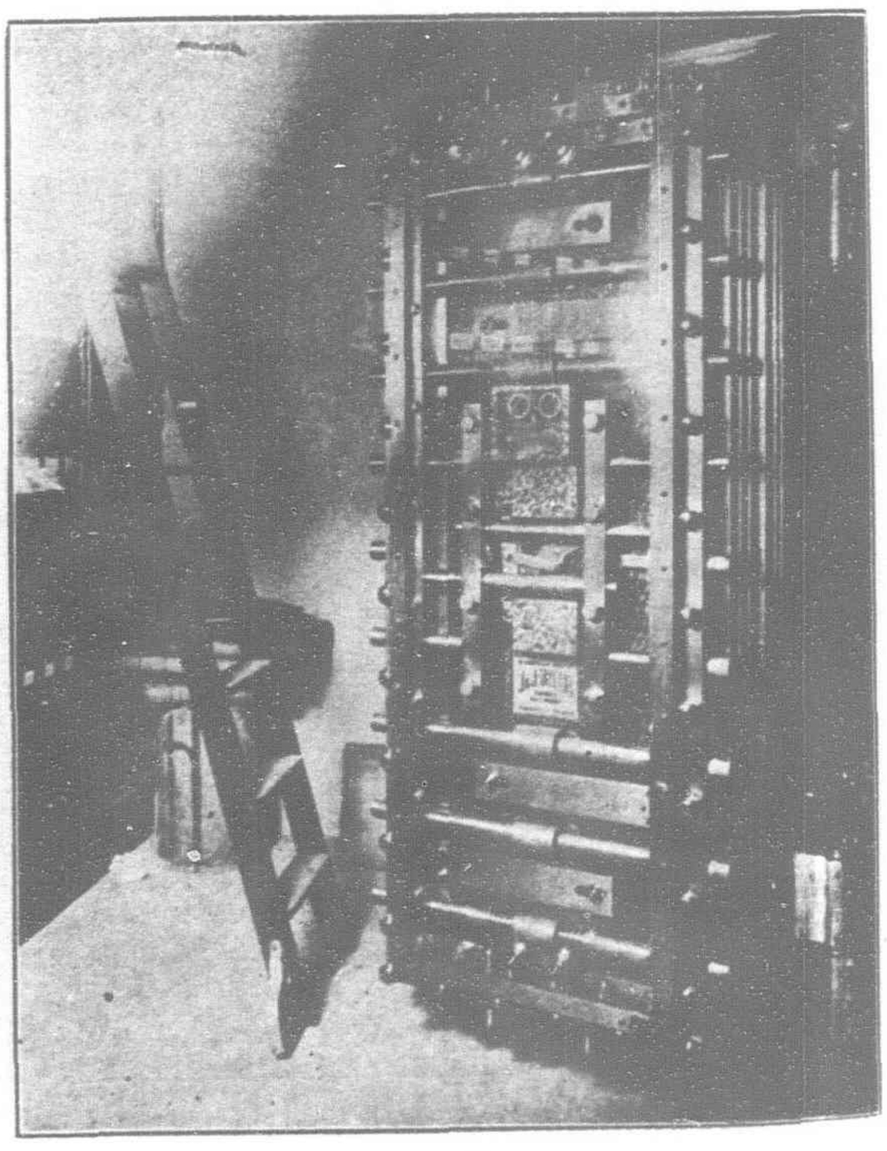
BUILDING OF THE CHINA MUTUAL LIFE INSURANCE COMPANY, LIMITED, SHANGHAI



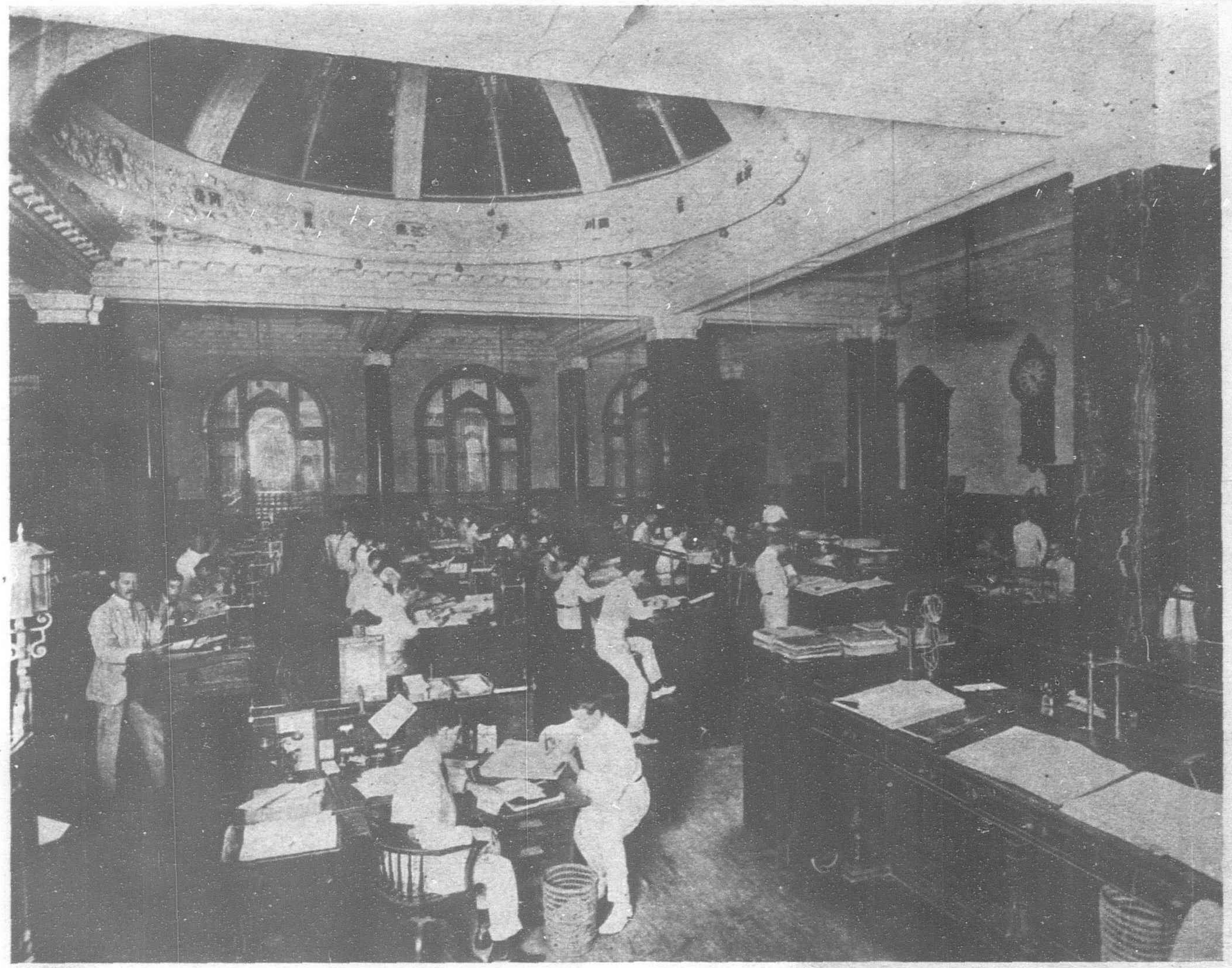
"CHINA MUTUAL" BUILDING—PUBLIC SPACE AND COUNTER IN GENERAL OFFICE

"CHINA MUTUAL" BUILDING—MAIN VESTIBULE SHOWING ENTRANCE TO GENERAL OFFICE

"CHINA MUTUAL" BUILDING—SECRETARY'S OFFICE



"CHINA MUTUAL" BUILDING—ENTRANCE TO STRONG ROOM



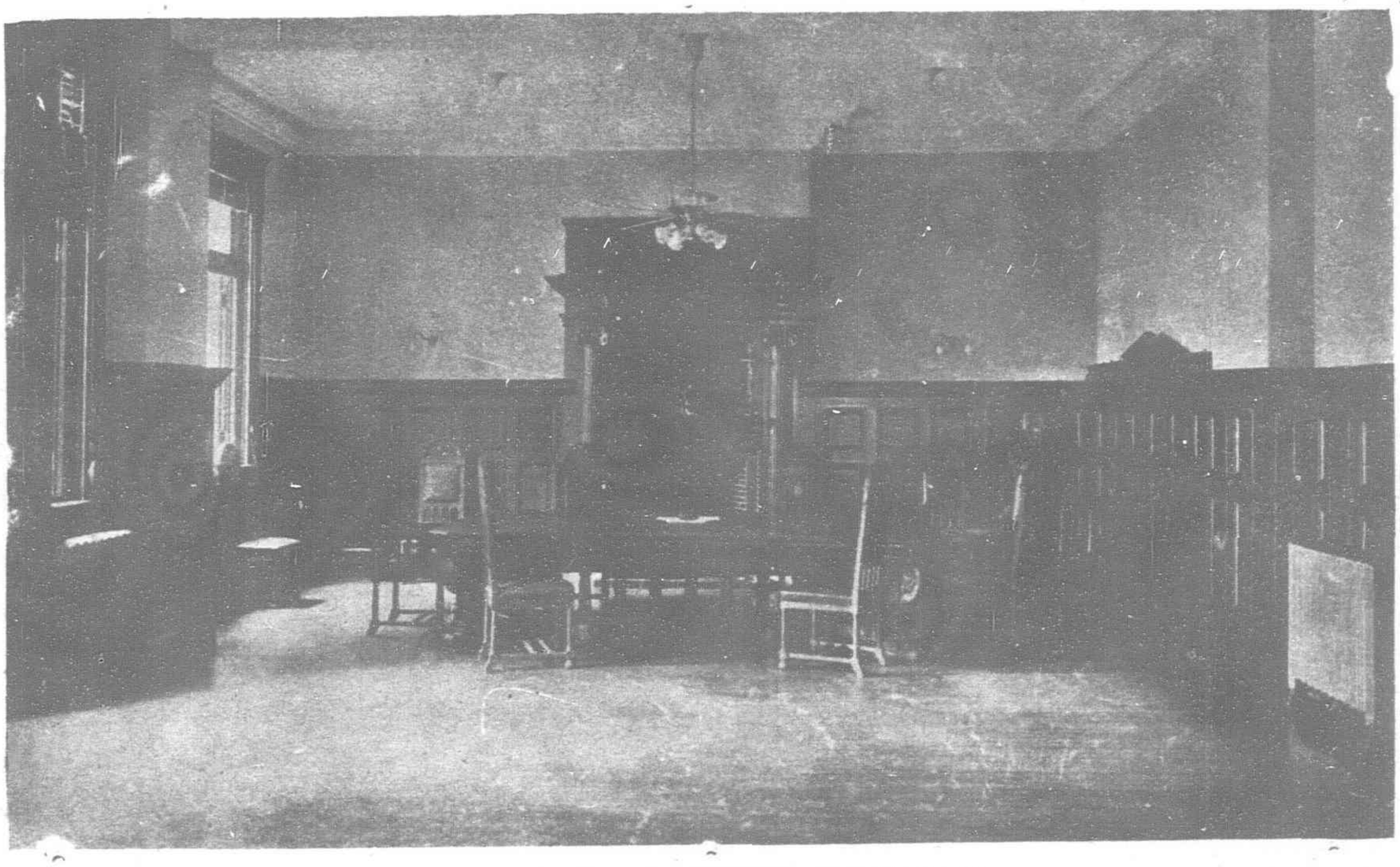
CHINA MUTUAL LIFE INSURANCE CO., LTD.—GENERAL OFFICE.

style (see illustration). The styles of the panelling and the detached columns are of transparent green Mexican onyx, the sunk panels being of Paonazzo marble. The whole of the moulded architraves, cornice arches, caps and bases are of white statuary marble. The flat-domed ceiling is inlaid with Salviati gold mosaic and the floor is carried out in marble to a geometrical design. Two exquisite carvings in high relief in white Carrara marble, having for their subjects the "Three Fates" and "Relieving the Aged," occupy the spaces over the two main doorways.

The principal stairway, which opens from this vestibule, is also entirely of marble. The

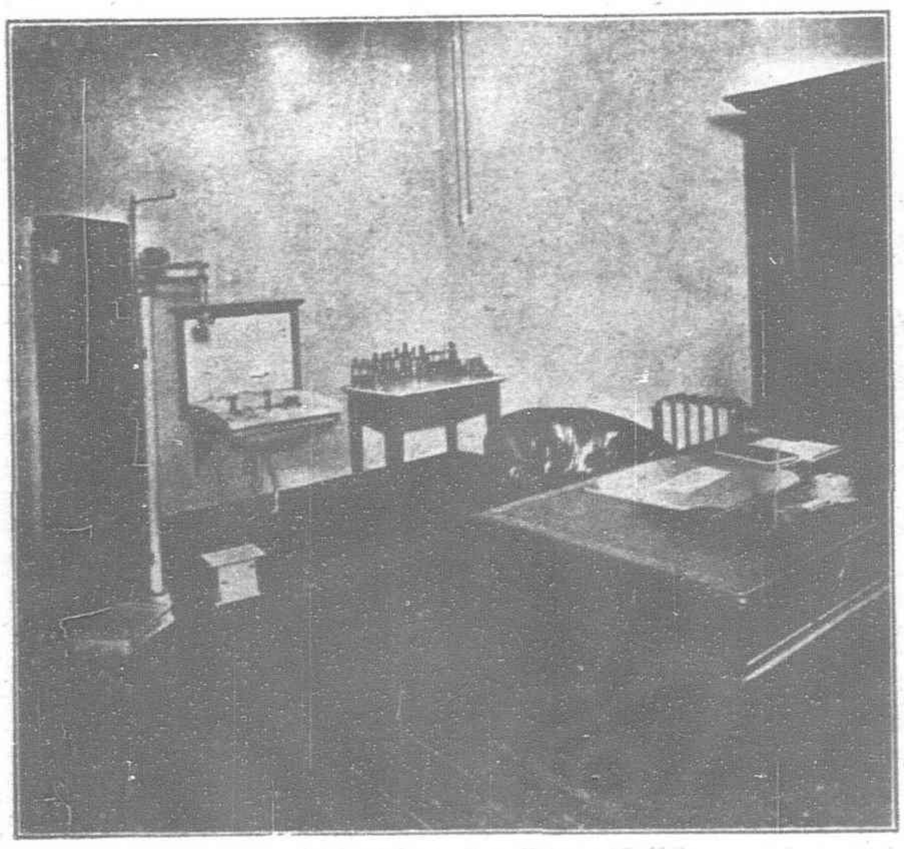
ONE OF THE ELECTRICALLY WORKED CALCULATING MACHINES USED BY THE ACTUARIAL DEPT.

"CHINA MUTUAL BUILDING"—OFFICE OF MANAGING DIRECTOR.

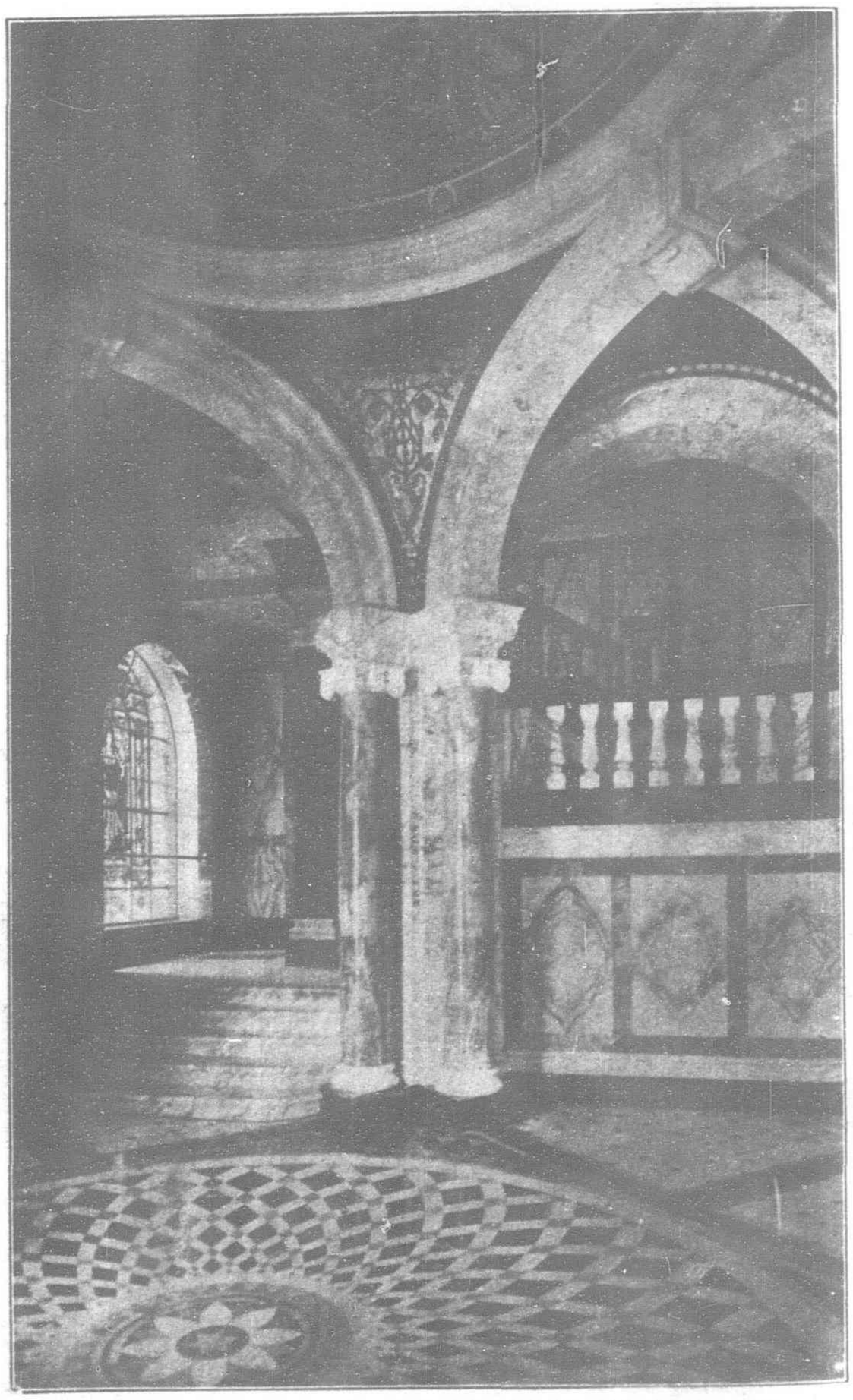


"CHINA MUTUAL" BUILDING—BOARD ROOM.

"CHINA MUTUAL" BUILDING—POLICY DEPARTMENT.



MEDICAL REFEREE'S OFFICE.



"CHINA MUTUAL" BUILDING—CORNER OF VESTIBULE LEADING TO STAIRWAY.

PHILIPPINE MINING NEWS

The work of development in the different mining districts continues and several flotations are under way. The New York Engineering Company is installing the new dredge on the Guamas property in Paracale and is expected to begin operations about August 1. The Colorado Mining Company's plant continues operating very satisfactorily and while on official report is available, the returns continue to maintain the usual average of about ₱30,000 a month.

THE UMEARI RIVER PLACER DISTRICT.—The Umeari Gold Limited, of Sydney, Australia, capitalized at £50,000, has been organized to acquire the rights of the Umeari Option Syndicate Co. Ltd., that holds a 99-year option lease from Messrs. Squires, Bingham & Co. and another on 1,600 acres of placer ground on the Umeari River on the east coast of Luzon in the province of Tayabas. The contracts provide that the proceeds of sale of all gold and other minerals and precious stones from the first claim taken up are to be divided as follows:—After payment of escort fees and exchange (if any), in payment to the company of £10,000 (which is to be taken as the cost of construction and erection of the first dredge), and in payment to the company of £30 per week for working expenses for each dredge operating on such claim, while working, until the £10,000 has been paid (and thereafter £60 per week,) and after such deductions 25 per cent of the balance will be payable to the owners, and remaining 75 per cent retained by the company.

The proceeds from any further claims taken up, after deduction by the Company or its nominee of £60 per week for working expenses of each dredge operating thereon, are to be divided as follows:—30 per cent to the owners or their nominee, and the remainder retained by the company or its nominee or nominees.

The following is the report of Herbert Park, C. E., who visited and tested the property in December, 1911:—*Situation.*—The Umeari River rises in the mountains in the province of Tayabas, on the east coast of the Island of Luzon, and flows in a northeasterly direction into the Pacific Ocean, on the southern side of Dingalan Bay, the mouth of the river being about fifty miles north-east of Manila in a direct line.

Mining Claims—The mining claims, all of which are dredgeable, have been located and recorded. These claims extend from the junction of the Ayungan and Umeari down the river about 15 miles, to within 1 mile of the mouth of the river.

The right to construct dredgers at the mouth and over this mile, and make further use of the land, as may be necessary incident to dredging operations, has been acquired by the syndicate.

Testing—On the Umeari No. 3 claim, two bores 3 inches in diameter were put down, with the following results:

Tube No. 4.—Depth, 15ft. Blue Wash not bottomed.

Free gold obtained	.134 grains
Amalgam	.097 "
Total gold	.234 grains

Equal to 1s. 3¼d. per cubic yard.

Tube No. 5—Depth, 14ft. 6in., less 18in., for log, equals 13ft. Blue Wash not bottomed.

Free gold obtained	.171 grains
Amalgam	.099 "
Total gold	.270 grains

Equal to 1s. 8½d. per cubic yard.

The wash at 14ft. 6 in. was improving, but owing to the boring plant being light, the pipes telescoped, and had to be drawn.

A bore put down by Mr. Hardman, about 300 yards further up the river, showed a depth of 26ft.

The above bores were put down close to the bores No. 1 and No. 2, by Mr. Hardman, which showed a value of 4 s. 2½d. per cubic yard.

Tube No. 7—Twenty dishes of surfacing, half a mile below the last bore, yielded .980 grains, equal to 10½d. per cubic yard.

Tube No. 6—Eight dishes from the surface at different portions of the beach yielded 413 grains, equal to 11d. per cubic yard. As the wash at 14ft. 6in. (Tube No. 5) was improving, and from the results of Mr. Hardman's bores, namely, 4s. 2½d. per cubic yard, I consider that 1s. 6d. per cubic yard is a conservative estimate of the value of the bores.

The gold from the bores and surface was cleaned and weighed at the Bureau of Mines, Manila.

The fineness determined on No. 3 sample gave 832.6 parts per 1,000 cleaned by water only, equal to 70 shillings 9 pence per ounce. The estimate per cubic yard has been determined at the above value.

The whole of the river above the Ayungan Junction has been taken up by the Philippine Exploration Company of Manila. This portion of the river, with the exception of half a mile above the Ayungan Junction, is too rough to dredge.

I saw some very fine prospects washed out from the side of the river, some going as high as 5 shillings per cubic yard. The company is at present installing a sluicing plant to work this portion of the river.

I would recommend that a dredger with a seven cubic foot bucket capacity be built, which would lift and treat 10,000 cubic yards per week.

I would also advise that the dredger be erected at the mouth of the river; float and dredge up the river, thus saving the cost of constructing roads and carting machinery. The river could also be tested at different places, and when dredging through the shallows, a number of which will have to be dredged, there is a sufficient depth of water to enable the dredge to be floated up the river a distance of 3 miles from the mouth.

It will take the dredger about eight months to get on to the Imeari No. 3 claim, but it is quite probable that a claim of equal value will be found nearer the mouth of the river.

I have arranged with the Vendors that in the event of the dredger being erected at the mouth, your company reserves the right to acquire any claims as they work up towards Umeari No. 3, the stipulation being that a dredger must be placed on any claim acquired within twelve months.

I estimate the cost of dredging and testing the river at different places between the mouth and No. 3 claim at £1,000. This estimate includes the amount of gold won.

Cost of Dredger.—I estimate the cost of a seven cubic foot bucket dredger in steel, to dredge to a depth of 40 ft. below water level, with duplicate parts erected and under steam at the mouth of the Umeari River, at £14,000. Cost of working up river, £1,000; total cost, £15,000.

Dredger at work on Umeari No. 6 Claim:

Treating 10,000 cubic yards per week, at 1s.6	£750
Working expenses	110
Showing a weekly profit of	650

or £32,500 a year of 50 weeks of 120 hours.

The cubic contents of one claim of 160 acres, 24ft. deep, equals 6,195,200 cubic yards.

It will, therefore, take a dredger with the above capacity twelve years to work out.

Fuel—There is an abundance of timber for fuel throughout the length of the river. The water is clear and fresh, with the exception of 3 miles of the tidal portion at the mouth.

Climate—The climate is very good. I did not hear of any fever whatever on the east coast.

Native Labour—The native labour is plentiful and satisfactory under white supervision, the maximum wages for the natives being 2s. per day.

Black Sand—The proportion of black sand concentrates from the bores put down to the total contents of bore 1-120417 grains, or nearly 1-lb. weight assayed by the Bureau of Mines, Manila, yielded after the free gold had been extracted, £12 per ton.

A similar sample was left at Manila for cyanide test. I have received a cable of the result, but it cannot be understood. I am waiting for the result by letter.

It would be advisable to get a few tons of this black sand treated after the dredger starts, and find out the best method of extracting the gold, the proportion of black sand concentrates being very great.

I have no hesitation in recommending this property as a sound dredging proposition. It is a virgin river, and all the claims are dredgeable.

By starting dredging operations, at the mouth of the river, the whole of the claims can be tested, and I am satisfied that some good ground will be found before the Umeari No. 3 claim is reached.

It will be gathered from Mr. Park's report that the climate is good, fuel abundant, and native labour plentiful and satisfactory at low rates.

The estimate of ⅙ per yard is, the directors believe, a most conservative one and is stated to be such by Mr. Park. It is, moreover, more than borne out by results of the Paracale Company, which is erecting large dredges on its properties within 500 miles of the Umeari River. The bore test of these Paracale claims gave ½ per yard only, while the average work-

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steps are of white asbescato, the plinths and skirtings are of verde alpi and the newel post and balustrade are of Paonazzo marble. The inlaid panelling is of green Mexican onyx. The entire marble work was designed and executed by Paolo Triscornia di Ferdinando of Carrara, Italy. The work was practically completed from the architects' designs in Italy and erected in Shanghai under the supervision of one of their own experts sent out for the purpose.

THE VAULTS AND STRONG ROOM.—The Company's valuable papers are stored in a series of vaults specially fitted with the latest steel filing devises supplied by the Library Bureau of Boston, U. S. A. Inside the lower vault is the strong room, in which the Company's securities and other highly important documents are deposited. The strong room is built entirely of "case-hardened" steel and is guaranteed both burglar and fireproof. The door (of which it has not been possible to get a very good illustration) is fitted with a double combination time lock, and though weighing 3½ tons is so admirably adjusted that little effort is required in handling it. The doors of the outer vault are provided with single combination locks, the whole equipment being the latest and most perfect system of safeguarding and preserving securities and valuable documents, the loss of which would be irreparable. The strong room, complete, together with all vault doors and steel divisions, were built by the firm of Messrs. J. & J. Taylor of Toronto, Canada.

The entire premises, from top to bottom, are provided with a combined system of heating and ventilation, on the low-pressure hot-water system. This work was carried out entirely by the Shanghai Waterworks Company, Limited, who also installed an excellent fire service throughout the building. Special arrangements are included whereby water at high pressure can be pumped through the house mains from hydrants outside. Swinging hose-racks of a very neat and convenient pattern are provided.

A quite up-to-date telephone service is installed—a very important matter in these days There are four trunk lines to the Telephone Company's exchange, in addition to which the building has its own private exchange—practically every desk being intercommunicated.

Well fitted lavatories are provided on each floor with hot and cold water supplies.

On the first floor are situated the spacious and handsome board room, the medical referee's office and the offices of the Shanghai Agency Department. The remainder of the building is leased out in suites of offices.

The building was erected by The Shanghai Building Company, under the supervision of the architects, Messrs. Atkinson & Dallas, from the design by Mr. F G. Drewett of that firm.

ing results for some time past have been 4/2 per yard.

Mr. H. Hardman, who was prospecting the several Umeari claims for 12 weeks on behalf of the owners, put down nine 3-in. bores over the various claims.

The tests as assayed in the Government Mines Office, Manila, showed values per cubic yard from depths ranging from 6ft. to 26ft. as follows:—4/5, 4/, 2/5, 10d., 2/10, 5/7, ½, 4/-, 2/5 the average being 3/- per yard.

Sluicing in Nueva Ecija—A company is being formed to undertake the saving of gold by sluicing at the headwaters of the Rio Chica immediatedly on the watershed that divides the sources of the Umeari that flows eastward and the Reo Chica that flows westward. The result of tests shows a high average of values. Water is plentiful and operations can be conducted very economically. The company proposed will be capitalized at ₱25,000 and operations will begin at once.

*THE CANSURAN GOLD FIELDS, MINDANAO

The property of the Surigao Gold Mining Co. consists of twenty-two (22) placer claims of sixty-four (64) hectares each, and eight (8) claims of thirty-two (32) hectares each, or a total of one thousand six hundred and sixty four (1,664) hectares (4,127 acres), comprising all the known mineral bearing ground in the Cansuran district, Province of Surigao, Mindanao, P. I.

The ground has been worked for a number of years by the natives in a desultory fashion, but notwithstanding their crude and uneconomical methods, its production, as estimated by former provincial officials, is within the neighborhood of ₱500,000.

The principal source of the gold is an ancient river bed now covered with detritus and a heavy growth of timber. Two distinct kinds of gold are found. One is light colored and angular with a large proportion of silver and is evidently derived from the disintegration and erosion of the neighboring hills. The other, a heavy reddish-yellow, well rounded gold, is found only in the ancient river channel and its tributaries, except where the creeks have cut across its course and concentrated its content in their own beds.

This old river channel is from one hundred (100) to two hundred (200) feet wide and can be traced for over a mile and a half in an easterly and westerly direction. The pay-streak is from six (6) to eight (8) feet thick consisting of ryolite, diorite, andesite and gasperoid gravel with a large proportion of boulders, and is topped by a clay overburden of the same thickness.

The natives in working this ground sunk pitching gopher holes to bed rock and scooped out the dirt at the bottom with coconut shells until they found their way blocked by boulders. Further work in that particular place becoming impractical another hole was sunk a short distance away.

The company permits the natives to work the shallow draws or arroyos on the property. The light colored gold before mentioned is found in the weathered dirt derived from the country rock and is recovered by ground sluicing—water being brought from the nearest creek in bark flumes. A small party of men and women working in this fashion for five or six hours a day will make an average daily wage of eighty (80) or ninety (90) centavos.

Messrs. Parker, Briggs, and McCulloch, the managing directors of the company, are carrying on sluicing operations on a portion of the old river channel near Cansuran creek. The creek has been dammed and the water brought in by four thousand (4,000) feet of ditch and flume to a storage reservoir above the workings. The overburden is ground sluiced off and the pay gravel shoveled into sluice boxes. The bedrock is a soft decomposed serpentine. About a foot of this is excavated and sluiced with the gravel. About 2,052 cubic yards have been sluiced to date and a total of 142 oz. recovered. This gives an average value of two (2) pesos and twenty (20) centavos to the cubic yard. (As before mentioned this ground has been partly worked by the natives. Patches of virgin ground are unbelievably rich. One pan of dirt taken under water contained $6.40 in coarse gold and small nuggets. Several good sized nuggets have been found. The two largest weighing $25.00 and $24.00 respectively.)

For a number of years Mr. Parker has been buying gold mined by the natives over a wide area on this huge property and thus has been enabled to form an estimate of the value of the outlying workings. He has United States Mint receipts in his possession covering gold to the value of $45,000 taken from these claims. His receipts for the year 1911 amount to $12,500 and this is by no means the total production as the Chinese merchants in Surigao have bought a much greater amount.

The principal streams of this district are the Tugunaan, Cansuran and Biga. These flow all the year though the Tugunaan is the only one to be depended upon for a good flow during the dry season and can be trusted to furnish one thousand miners' inches at the lowest stage. This water can be diverted and brought by sixteen hundred (1,600) meters of ditch and flume to the present reservoir. A preliminary survey has been made and no especial difficulties are anticipated. A pressure box below the reservoir will give a head of over four hundred (400) feet at the lowest point that can be economically worked by hydraulicking. If desired, a much greater head can be obtained by damming the river further up stream.

A number of claims have been located below the junction of the Cansuran and Biga for the purpose of dredging at a later date if deemed advisable, also as a depository ground for tailings. Messrs. Parker and Briggs have sunk a number of prospecting holes in this ground with a Taylor drill and express themselves quite satisfied with the results obtained.

The rainy season in Surigao Province extends from November until May and the annual rainfall is excessive, being over one hundred (100) inches. A number of small creeks crossing the ditch line can be expected to contribute a large amount of water during the wet season and it is estimated that at least three thousand (3,000) miners' inches will be available in the winter months and a minimum of one thousand (1,000) miners' inches in the driest part of the year. With efficient hydraulic equipment using the maximum amount of water available in both seasons there should be a total yearly output of seven hundred thousand (700,000) cubic yards of gravel. To properly sample this huge area at least four months should be spent in sinking shafts and drilling, but judging from samples taken from the present workings, old gopher holes and exposed faces, the average gold content of the ground is over $0.40 to the cubic yard. This ground should be worked at a cost not to exceed $0.08 per cubic yard.

The Cansuran district is sixteen (16) kilometers from the town of Surigao, a good seaport and the capital of the province. Roads are bad in the rainy season, but the government is now building a road well ballasted with river gravel which will pass within four and one-half (4½) kilometers of the property. Labor is scarce and not very efficient, but when the company commences operations on a large scale this difficulty can be overcome by importing laborers from Cebu.

The officials of the company are to be congratulated on the amount of work done to date considering the physical drawbacks of the country and the limited amount of capital at their disposal.

*By E. R. Hinckley.

CONTRACTING NEWS

ERECTION OF STEEL BUILDINGS AT RIVERSIDE POWER STATION FOR THE ELECTRICITY DEPARTMENT, SHANGHAI MUNICIPALITY.—The tender of Ah Choy at 10,620 Taels was accepted. The following bids were submitted:

Shanghai Dock & Engineering Co., Ld.	Tls. 14,870
Vulcan Ironworks, Ld.	13,600
Heng Chong-chang	13,530
New Engineering & Shipbuilding Works, Ld.	13,325
Chu Chong & Co.	10,750
* Ah Choy	10,620
Kau Ning-fore	8,955
Fah Shing Ironworks	8,795
Oriental Engine Works	8,350
Young-foo	8,150

ONE 12 H. P. MOTOR CAR FOR THE ELECTRICITY DEPARTMENT, SHANGHAI MUNICIPALITY.—The Deasy Motor Car Co. secured the contract for the delivery of a Siddeley-Deasy motor for £402.3.6. The following tenders were submitted:

TENDERERS.	CAR	PRICE £ s. d.	Tls.
C.I.F. Shanghai			
P. Heath.	R. C. H.	230. 0. 0	
"	Krit.	260. 0. 0	
"	Overland.	275. 0. 0	
Oriental Automobile Co.	Hupmobile		2,000.00
Argylls Ld.	Argyll	398.10. 4	
Deasy Motor Car Co.	Siddeley-Deasy	402. 3. 6	
Clement Talbot Ld.	Clement Talbot	428.10. 0	
Turner Petrol Cars Ld.	Turner	436.10. 0	
Horse Bazaar	Berliet		3,600.00
De Dion Bouton	De Dion	441. 2.11	
Sennet Freres	Delage	500. 0. 0	
	Brazier	500. 0. 0	
S. F. Edge.	Napier	608.15. 6	
F. O. B. London or Hamburg.			
Alldays	Alldays & Onions	340.15. 0	
Siemens China	Protos.	341.10. 0	
Argylls Ld.	Argyll	346.10. 4	
Deasy Motor Car Co.	Siddeley-Deasy	365. 3. 6	
Clement Talbot	Talbot	384.10. 7	
De Dion Bouton	De Dion	392.10. 5	
Star Engineering Co.	Star	412. 5. 0	
S. F. Edge.	Napier	547.17. 6	
Miles-Daimler-Mercedes Daimler Co.	Mercedes Daimler.	552.17. 2	
		568. 0. 0	

1,320 YARDS VULCANIZED RUBBER CABLE—SHANGHAI MUNICIPALITY—The tender of Messrs Inniss and Riddle, £335, was accepted, the Shanghai Electric & Asbestos Company having submitted an incomplete bid. The following proposals were submitted:

Tender No. 36.

1,320 yards Vulcanized Rubber Cable

Andersen, Meyer & Co.	G$1,568.00
British Insulated & Helsby Cables Ld. (Scott Harding & Co.)	£432.18.0
Arnhold, Karberg & Co.	397. 0.0
General Electric Co. of China, Ld.	369. 2.0
Jardine, Matheson & Co., Ld.	338.18.6
Inniss & Riddle.	335. 0.0
Shanghai Electric & Asbestos Co., Ld.	264. 6.0

80 DRUMS OR 8,000 LBS, ANHYDROUS AMMONIA FOR THE U. S. Q M. DEPARTMENT, MANILA.—Bids submitted for pound units as follows:

Frank L. Strong, $0.3925, Pacific Commercial Company, $0.565, Macondray and Company, $0.2975, Germann and Company, $0.59 Additional charge for loss of drums, Frank L. Strong, $35.00 each, Commercial Pacific Company, $15.00, and Macondray and Company, $30.00.

PROPOSALS INVITED—11,600 yards Khaki Drill, 200 yards Khaki Cord and 3,500 yards Camlet for the Shanghai Police force to be opened July 31.

PROPOSALS INVITED—150 radiators luminous type for the Electricity Department, Shanghai, to be opened June 8.

THE GOVERNMENT OF THE PHILIPINE ISLANDS, DEPARTMENT OF THE INTERIOR, BUREAU OF FORESTRY, OFFICE OF THE DIRECTOR, MANILA, APRIL 9, 1912.—Sealed proposals in duplicate will be received at the office of the Director of Forestry in Manila until noon July 20, 1912, and then publicly opened by him in the presence of attending bidders, for the privilege of cutting and gathering timber and other forest products, stone and earth, in the public forests located around the north and west shore of Dumanquilas Bay, Moro Province, Philippine Islands, described as follows:

"In the District of Zamboanga, Moro Province, beginning at the mouth of the Cumalarang River on the north coast of Dumanquilas Bay, thence up this river in a northerly direction to its source, thence in a southwesterly and southerly direction following the main divide between Sindangan, Sibugey and Dumanquilas Bays to the west mouth of Canalizo Strait, thence along the coast in an easterly and northeasterly direction to the point of beginning. This territory comprises an area of approximately 20,000 hectares."

The privilege to be granted will be in the form of a twenty-year exclusive license agreement to cut and gather timber, firewood and other forest products, and remove stone and earth, from the public forest above mentioned, subject to the payment of charges and taxes as provided by law. Bids should state the size and kind of plant to be used, and date of installation of same; also the minimum output of timber during the first two years and each succeeding year thereafter. No bid will be considered which does not provide for a minimum output of 40,000 cubic meters during the first two years, a minimum of 40,000 cubic meters during the third year and a minimum of 50,000 cubic meters during the fourth and each subsequent year of the license agreement. Preference will be given to the bidder offering to install the most complete and effective plant most promptly, with best security for performance. (If two or more bids are equally good, and one of the bidders is actually operating on the tract, preference will be given to the latter.)

All proposals must be accompanied by a certified check or properly executed and satisfactory bond, for ten thousand (₱10,000) pesos, Philippine currency, to secure prompt installation and observance of the terms of the license agreement.

The terms of the license agreement will include:

1.—That the successful bidder shall furnish a capital of not less than two hundred thousand (₱200,000) pesos, Philippine currency, for the immediate prosecution of the work.

2.—A required output during the first two years, and an additional amount each succeeding year up to the fourth year, after which period the annual minimum output to be that prescribed for the fourth year, viz, fifty thousand (50,000) cubic meters of timber.

3.—A modern sawmill, or sawmills, and logging equipment having a capacity of manufacturing the prescribed quantity of timber mentioned above.

4.—That disposal of public lands in the district, in accordance with the public land law, be not affected by the license agreement.

5.—That residents of the region continue to have the privilege of gathering forest products for their personal use, as previous to the date of the license agreement, and that licensees who hold at present annual licenses in the district above mentioned, will be allowed to continue operations until September 30, 1912.

6.—That the Forest Act, as amended, Forest Regulations, and the instructions of the Bureau of Forestry, as issued from time to time, governing the proper gathering of forest products, be complied with

7.—That all timber be measured and appraised in the woods, or at the mill before sawn, at the discretion of the Bureau of Forestry.

8.—That in order to prevent the destruction of the forest by caiñgin-makers and other trespassers, the successful bidder shall deposit with the Director of Forestry within thirty (30) days after the execution of the license agreement and on the first day of July of each year thereafter, during the continuance of the license agreement, the sum of six hundred (₱600) pesos, Philippine currency, which sum shall be spent in providing two or more forest guards who shall be employed under the direction of the Director of Forestry or the local forest officer in preventing first, caiñgin-making, and other forest destruction within and contiguous to the area embraced in the license agreement.

9.—If the successful bidder does not take advantage of the terms of the license agreement within six months from the date of its approval, it may be declared null and void, and the security forfeited.

10.—The undersigned reserves the right to reject any and all bids.

Information regarding the public forest tract may be secured from the Director of Forestry.

All proposals should be plainly marked "Proposal for an Exclusive Twenty-Year license for a Forest Tract on the north and west shore of Dumanquilas Bay, Moro."—W. F. SHERFESEE, Acting-Director of Forestry.

OFFICE OF THE BUREAU OF SUPPLY MANILA P. I., APRIL 26, 1912.—Sealed proposals in triplicate will be received at this Office up to 11 a. m., June 14th, 1912, when they will be opened in the presence of the attending bidders, for furnishing and delivering SCALES, POSTAL.

Proper forms and specifications may be had on application to this Office.—E. G. SHIELDS, Purchasing Agent.

PROPOSALS FOR COAL BOAT:—HEADQUARTERS PHILIPPINES DIVISION, OFFICE OF CHIEF QUARTERMASTER, MANILA, P. I., MARCH 22, 1912.—Sealed proposals, in triplicate, for furnishing the Quartermaster Department U. S. Army, at Manila, with One Coal Boat will be received here until 11:00 a m. June 15th, 1912, and then publicly opened. Information and blank forms furnished upon application. I. W. Littell, Assistant Quartermaster General, U. S. Army, Chief Quartermaster.

AMERICA.—An Englishman with first class connection among buyers in the States and Canada is open to represent an established China house of good standing desirous of extending its trade there. In the event of favorable negotiations advertiser is prepared to visit China to complete arrangements.—J. P. W., care of FAR EASTERN REVIEW, Manila, P. I.

FAR EASTERN RAILWAYS

PHILIPPINE RAILWAY COMPANY.—The auditor's office of this Company will be removed to Iloilo June 1, leaving only that of the General Manager and Vice-President at Manila. The offices of the engineering staff, purchasing agent, etc., were previously concentrated at Iloilo. The head office will remain nominally at Manila.

PRIVATE RAILWAY IN NEGROS.—The towns of Candalaun and Plupanton in Occidental Negros will be connected by a steam railway line by the end of the year. This section is one of the most prosperous sugar-producing areas in the island and the line will connect a number of large sugar centrals with the port. When completed it will operate for 26 kilometers, and the contract price including rolling stock etc., is ₱300,000. The towns of Laca Lota, San Enrique, and Valladolid will be tapped, and at each of these points it is proposed to erect large centrals.

THE TRANS-SIBERIAN RAILWAY.—The doubling of this line west of Lake Baikal is expected completed this year and with the completion of cut off lines 170 miles will be saved in crossing the continent and the journey from Paris to Peking reduced to 9.5 days.

The reports for the fiscal year 1910 show a total of receipts for passenger traffic to have been £132,000 an increase of 38%. The increase for 1911 was much greater as the line is becoming more and more popular with European travelers.

Negotiations are reported under way with the Canadian Pacific Company to complete an all around the world connection via Manchuria and Siberia, but so far no great headway is reported.

AUSTRALIA IMPORTS LOCOMOTIVES.—Notwithstanding the declared purpose of the railway authorities to have all supplies manufactured in Australia they have found necessary to order twenty locomotives from abroad in order to be in a position to handle the wheat crop. The local works are run to their capacity and for the present will be unable to meet the increasing demand for rolling stock.

STORM WRECKS TOKAIDO TRAIN.—Twenty freight cars were blown from a bridge on the Tokaido line last month and the locomotive thrown from the track which was badly damaged for some distance.

THE CHANGCHUN-KILIN RAILWAY.—A protest has been filed by the Japanese government against the delay featuring the construction of the line from Kilin in charge of the Chinese. This line is being built with Chinese and Japanese capital. The Japanese paid in their share of the capital and prosecuted the work vigorously from Changchun. They claim that work on the Kilin end has been unnecessarily delayed.

SIAMESE RAILWAYS.—According to Vice-Consul General Hanse at Bangkok, it is learned from un-official sources that extension of the Northern Siamese State Railway to Chiengmai has been decided upon. The distance from Bangkok to Chiengmai by this route is 470 miles and the proposed extension embraces 140 miles of the distance.

About three years ago it was announced that the Northern Railway would only be extended as far as Sala Meh Puak, and that the Government would take no additional loan for extending this line farther north, and at the same time it was also intimated that a loan of $7,300,000 would probably be required if the line were to be carried on to Chiengmai. The details for the present financial program, however, are still under consideration. It is understood that the cost of this extension will be heavy, as in order to reach the northern capital a low range of mountains has to be crossed or gone through.

The line from the present terminus, Dene Chai, will go via Pang Puei, tapping the Muang Long plain, and, crossing the Rivers Meh Yome and Meh Vang, will emerge on the Chiengmai Plain through a tunnel nearly a mile in length. This extension is important for the development of northern Siam, with its possible resources in agriculture, mining, and forestry.

Further extension of this railway to the northern frontier would suggest connections with possible railway systems of the British-Shan States and southern China.

NARITA RAILWAY.—At the general meeting of the Narita Railway Company the following plan of accounts and distribution was approved:

	Yen.
Net profit	98,069
Balance brought over from previous accounts	3,934
Total	102,003
Disbursements	1,818
Légal reserve	5,000

Special reserve	9,900
Bonus to officials	8,500
Dividend to shareholders	72,750
Balance carried forward to next accounts	4,135

TOBU RAILWAY CO.—The semi-annual general meeting of the Tobu Railway Company was held Thursday morning, presided over by President Mr. K. Nedzu. The following plan of accounts and distribution was unanimously adopted:

	Yen.
Gross receipts	161,265
To reserve	7,700
Dividend to shareholders (9 per cent. per annum)	143,100
Balance carried forward to next term	10,360

SIBERIAN RAILWAY CONSTRUCTION.—Consul Jewell of Vladivostok states that a single track of rails has been laid on the ice across the Amur River at Khabarofsk and that a provisional railroad has already been constructed about 100 miles inland, paralleling the Amur River. The road is lightly constructed with frozen ground and snow and is being used this winter for provisioning a large supply camp of the Amur Railroad.

Work has already commenced on the tunnels through the Hingan Mountains, and a great amount of activity is seen along the entire line of the future railroad. In the middle of January the Government was purchasing large quantities of wheat and oats in the Amur Province, paying about 5 cents a pood (36,112 pounds) more for it than were any of the flouring mills.

RUSSIAN LOCOMOTIVES.—The Minister of Communications has submitted estimates for 1,071 locomotives, the construction to cover about three years. These locomotives will be made available for military transport.

JAPAN'S RAILWAY APPROPRIATION.—Vice-President Hirai of the Railway Board announces the Annual Report of Japan's Railways:

The total receipts of the State railway lines during last fiscal year ending March 31 are returned at 97,954,771 yen, an increase of 6,247,888 yen over the estimate and 10,006,580 yen over the actual receipts of the previous fiscal year. Adding to the sum 1,010,000 yen of the receipt from the conveyance of mails, 1,350,000 yen of miscellaneous receipts, and 550,000 yen of receipts from private railways for the conveyance of goods and passengers on the connection service, the total revenue will reach 100,090,000 yen, showing an astounding increase over the previous returns. Compared with the previous year the figures are apportioned as follows:—

Months.	Actual receipts for 1910-1911	Actual receipts for 1911-1912
April	8,723,194	10,153,737
May	7,975,213	8,746,009
June	6,433,902	6,978,393
July	6,761,741	7,432,705
August	6,198,776	7,791,849
September	7,197,290	8,006,254
October	8,020,292	8,648,160
November	7,571,117	8,240,202
December	7,681,962	8,371,294
January	6,984,198	7,609,939
February	6,794,862	7,612,352
March	8,440,675	9,288,480

The following is the allotment of the 25,000,000 yen appropriated for improvements:

About 60%, or from 15 to 18 millions, is to be spent for way works.

Rolling stock will require between 7,400,000 and 7,800,000 yen or 26 per cent.

The electric equipment calls for an expenditure of between 2,750,000 to 3,300,000 yen or 11 per cent.

And 3 per cent. will be spent on steamers—or 750,000 to 900,000 yen. Among the more important items will be the laying of two more tracks between Shimbashi and Yokohama, an improvement urgently needed owing to heavy traffic on this line and the present inadequate train service. Changing the line between Kodzu and Numadzu will be an important undertaking and beyond Numadzu laying tracks in a good many places in order to keep the grade above the flood line.

Perhaps the next thing in importance is the improvement of stations. At present the accommodation is decidedly limited, and it has come to such a point that enlargement is a matter of absolute necessity. The principal stations to be enlarged are at Nagoya and Kyoto. The ground has already been acquired and we will go on with the work.

The increasing of the rolling stock will take a large share of the appropriation. Again where there are steep grades the lines will be electrified. For instance the grade between Yokokawa and Karuizawa is one in fifteen, and electrification would be of immense advantage there. At present we are trying out twelve electric locomotives or 'rack' locomotives as they are often called, and hope to have them running on regular schedules soon. They will take the place of the 'abt' engines, although of course we haven't altogether dispensed with the steam locomotives.

Replacing sixty pound rails with seventy five pound rails on all the important lines and extending the workshops in various places about completes the list of more important improvements.

SHIMONOSEKI-MOJI RAILWAY CONNECTION.—Two civil engineers, says the *China Mail*, are busily engaged at present in comparing the relative merits of a bridge and a tunnel for connecting Shimonoseki with Moji, and thus establishing railway communication between the two places. Professor Hiroi, who advocates a suspension bridge, calculates that it will be 1,800 feet long and that it could be built in such a manner as to allow ships to pass under it easily. Professor Jimbo, who supports the idea of a tunnel, says that two sites offer themselves for choice. Both would be treated similarly; that is to say, iron tubes would be laid from shore to shore at a maximum depth of 90 feet below the bottom of the sea. Both sites are equally eligible, for, although one has shallow water compared with the other,, the length in the former case would be a mile and a half and in the latter only a mile. Thus the advantage of shallow water would be counterbalanced by increased length. There will be only a single line of railway, and the width of the tube through which it will run would be 17 feet for narrow gauge and 33 feet for the broad gauge. Whether the bridge will be built or the iron tube be laid, the work will be the greatest of its kind in the world. Nothing has yet been published as to the cost.

FAR EASTERN ENGINEERING, CONSTRUCTION, COMMERCIAL AND FINANCIAL NEWS

ELECTRIC RAILWAYS, LIGHT, POWER, TELEGRAPHS, TELEPHONES, AVIATION, ETC.

AUSTRALIAN GOVERNMENT, ELECTRIC GENERATING PLANT.—Consul General Bray of Sydney writes that one of the first enterprises to be undertaken in building the Federal capital city at Canberra, New South Wales, is the erection of a 600-kilowatt power house on the banks of the Molonglo River. From this the Director General of Works intends to get power for the brickworks, tunneling, water-pumping plants, lighting, and haulage. Cabinet consideration has led to the adoption of a semi-Australian-made policy. The Government instructed the Home Affairs Department to advertise for tenders only in the Commonwealth, but to consider those forwarded from other parts of the world. Triple-expansion, highspeed engines are required. The Minister for Home Affairs states that he intends to encourage local manufacture to the extent of substantial preference. In the Federal capital estimates of £20,000 ($97,200) were set down for the plant When it is ready the water scheme, estimated to cost $1,020,600, and the brick works, $145,800, will be proceeded with. The actual work of building the city will be commenced when the temporary water supply and sanitation systems are ready for the workmen to be employed.

CHINESE AVIATION.—Z Y. Lee, a Chinese aviator, made a number of successful ascents near Shanghai last month with an Etriech monoplane.

GREAT NORTHERN TELEGRAPH AGREEMENT.—The arrangement between this company and Japan providing a monopoly of the transmission of messages over the Nagasaki-Shanghai and Nagasaki-Vladivostok lines expires, the latter part of the present year and the Japanese press is agitating the purchase of the line to Shanghai. The expiration of the agreement permits Japan to land cables in Japan but as the Northern has a monopoly in China until 1930, it will be difficult for the Japanese to establish competitive lines.

TOKYO'S MILLION LIGHT SCHEME.—The Government has rejected the proposed scheme of the Municipal Electric Bureau to augment the generating capacity of its plant to 1,000,000 lights on the ground that it involved unnecessary expense as the combined capacity of the present electric lighting department of the Municipal Electric Bureau, the Tokyo Electric Light Company, and the newly organized Japan Electric Light Company is enough to meet the demand in the urban and suburban districts at present. Secondly, the condition of Municipal finances does not warrant any work of no immediate need, involving large disbursements, as the Municipality has a heavy burden of debts amounting to over 100,000,000 yen, and besides has many works of imperative necessity, such as the extension of water works, the improvement of the sewage system, etc., all of which call for speedy execution.

The government was willing, however, to approve of increase up to a limit of 100,000 kilowatts.

THE HONGKONG ELECTRIC COMPANY, LTD.—Following is the directors' report for the year ended February 29, 1912:

The balance at credit of profit and loss account is $235,601.03; after deducing directors' fees ($3,000) there remains a sum of $232,601.03 available for appropriation, and your directors recommend that this be disposed of as follows:

To pay a dividend of 14 per cent:—	
Say $1.40 per share on 60,000 shares	$84,000.00
To place to reserve	30,000.00
To write off plant account for depreciation	97,747.93
To write off furniture account for depreciation	473.94
To pay a bonus to staff	4,505.19
To carry forward to next account	15,873.97
	$232,601.03

LIABILITIES

Capital:—	
60,000 shares each $10 paid up	$600,000.00
Sundry creditors	5,180.00
Dividends unclaimed	8,898.34
Suspense account	1,744.89
Balance of profit and loss account	235,601.03
	$851,424.26

ASSETS.		
Plant and Mains account, cost of, as per last account	$551,623.34	
Less amount provided for depreciation	81,623.34	
	$470,000.00	
Cost of plant, since added	67,747.93	
		$537,747.93
Property, cost of Land and Buildings as per last account	$ 96,722.30	
Less amount provided for depreciation	6,722.30	
	$ 90,000.00	
Cost of Buildings, since added	192.50	
		$ 90,192.50
Installation Material, Stock of		35,149.85
Stores and Coal, Stock of		9,685.83
Tools, &c., Stock of		1,553.30
Furniture, cost of, as per last account	$ 237.00	
Cost of Furniture, since added	736.94	
		$ 973.94
Insurance, Value of unexpired portions of Policies		1,650.00
Sundry Debtors		68,446.92
Cash with Agents		52,261.48
Hongkong and Shanghai Banking Corporation		53,762.51
		$851,424.26

JAPANESE WIRELESS TELEPHONY.—Experiments were conducted last month in Tokyo Bay between the Okinawa Maru and a wireless telephone station on shore. Messages were exchanged up to a distance of 20 miles so that they could be understood very clearly.

MANILA ELECTRIC R. R. EXTENSIONS.—The Manila Electric Railroad and Light company is planning extensions on Santo Cristo street from Arroceros to San Fernando, a line on Calle Magdalena running past the university hospital, an extension of the Taft avenue line down Herran and Marcelino along San Andres to Sandejas, an extension of the Pasay line to Pasay and the Manila Polo Club.

MANILA'S GAS PLANT.—Construction of the Schweisser Gasgesellschaft syndicate will begin about July 1 on a site near the Pasig river in the Paco district. The cost of building the plant will be about ₱4,000,000. Seven buildings will be erected.

PHILIPPINE CABLES.—The cableship Rizal was dispatched last month to the south with 100 miles of new cable in her drum to be laid in southern waters.

THE TASMANIAN HYDRO-ELECTRIC POWER SCHEME.—We are informed, says the *Mining Journal*, that the representatives of the Tasmanian Government in London have recently received the following official communication: "The hydro-electric power scheme for utilising the waters of the Great Lake is now well under way, and the head works from the Lake to the site of the power house are nearing completion. Contracts for the first unit to develop 9,000 h. p. have been entered into with the British Westinghouse Company for the power station its equipment and transmission lines for 20,000 h. p. to Hobart, and with Messrs. Jens Orton Boving for the steel pipes and plant in connexion with the turbines. These works are to be completed by the end of the year. The Great Lake is situated at an elevation of 3,800 ft., and experts state it is capable of developing from 80,000 to 100,000 h. p. It is anticipated that the utilisation of this cessions on the Tano river covering waterfalls and rapids, which will supply the necessary electric power for working the mining concessions which may be purchased. It is estimated that by this means a saving of 50 to 60 per cent. can be effected in the power costs, equal to from 3s. to 6s. per ton of quartz mined. A transmission line of only sixty miles would enable the power not required by the company to be supplied to the Tarkiva mines. The nature of the mining properties acquired appears from the statements at the meeting, which is reported elsewhere in this issue.

TOKYO TRAMWAY EXTENSIONS.—At a meeting of the Electric Business Committee of the Tokyo Aldermen's Council the following extraordinary budget for the municipal electric business was adopted:—

Construction of electric tramway lines:—

	Yen.
Land	1,823,820
Rails	675,000
Rolling-stock	800,000
Buildings	126,180
Installation of hydro-electric plant	2,300,000
Execution of plan and supervision of work	37,500
Total	5,762,500

Supply of electric current:—

Land	7,200
Buildings	87,200
Construction of distributing station	271,880
Construction of electric circuit	1,550,600
Fixing expense	120,200
Execution of plan and supervision of work	50,000
Total	2,087,070

GREAT NORTHERN TELEGRAPH.—The directors of the Great Northern Telegraph Company, Limited, of Denmark, announce that the traffic receipts for the year 1911 have, as foreseen, decreased considerably owing to the loss of the company's Norwegian concessions, the sale of the Korean cable, and the tariff reductions made during the year. The decrease has, however, been partly counter-balanced by the increase of the Government and Press correspondence caused by the extraordinary events which the year 1911 has witnessed, especially the revolution in China. The net receipts for the year have decreased by about £24,000, compared with the year 1910, but as this amount is not larger than was expected and a greater balance than usual was carried forward to 1911, the board of directors do not hesitate to propose the distribution of a total dividend and bonus of 18 per cent., including the 5 per cent. already paid, and to transfer to the reserve and pension funds the usual amounts of £55,555 and £11,111 respectively.

PERAK HYDRO-ELECTRIC CO.—The Perak Hydro-Electric Power Syndicate, Limited, has been registered with a capital of £10,000 in £1 shares.

At an extraordinary general meeting of Reuter's Telegram Company, Limited, held on 2nd inst., a resolution increasing the capital to £500,000 by the creation of 12,500 new shares of £2 and 37,500 new shares of £10 each was carried unanimously.

JAPANESE POSTS AND TELEGRAPHS.—The number of telephones to be newly installed during the present fiscal year amounts to 27,000 and the expenditure required for the purpose to 6,500,000 *yen*. The length of wires will be something like 2,500 miles. As in the preceding fiscal year, the so-called prompt installation system will be adopted in the large cities, namely, Tokyo, Osaka, Kyoto, Kobe, Nagoya and Yokohama. New telephone exchanges will also be established in both Osaka and Kobe.

PUBLIC WORKS, DOCKS, WHARVES, BUILDINGS, ETC.

DREDGER FOR BURMA PUBLIC WORKS.—Messrs. William Simons & Co., Ltd., recently launched from their works the dredger "Oswald." This dredger, which is of the "Simons" suction reclamation type, has been specially designed and constructed under the direction of Professor J. H. Biles, for the improvement of the waterways in Burma. The "Oswald" is a twin-screw, light-draught cutter dredger, and will work in conjunction with a floating pipe-line and terminal pontoon, arranged for delivering dredged material over river or canal banks for land reclamation. The dredging-pump is driven by an independent set of triple-expansion engines, and the suction pipe is carried on a frame fitted in well at forward part of vessel. The lower end of suction frame is fitted with a steel spiral rotary cutter, driven by cast-steel, machine-cut gearing from a set of horizontal compound engines placed on deck. The gearing and cutter are of ample strength to stall the engines when working at full power. Independent steam hoist gear is provided for controlling the suction frame, and very powerful manoeuvring winches are placed at each end of vessel. An operating house is provided on upper deck containing all necessary levers and telegraphs to enable one man to have complete control of the dredging operations. The dredger is propelled by twin screws, each driven by a set of triple-expansion engines. Steam is supplied by two cylindrical multitubular boilers, constructed to Lloyd's requirements for a working pressure of 160 lbs. The boilers are fitted with Howden's forced draught for burning Indian fuel. A complete installation of condensing plant capable of dealing with exhaust steam from all the engines in the vessel at one time, independent automatic feed pumps, bilge pumps, service pumps, pressure pumps, filters, and all the other usual auxiliaries for a vessel of this type, are provided in engine room. A repair shop, with electrically driven machine tools capable of overtaking minor repairs, is fitted on board. Electric light installation is provided both above and below deck. The vessel is provided with every accommodation necessary for a crew working in a hot climate.

OIL ON PHILIPPINE ROADS.—The Bureau of Public Works are experimenting with oil for the elimination of dust, and the hardening the road surface to withstand washouts during the rainy season.

FIVE-STOREY BUILDINGS FOR MANILA.—The Masonic Association has purchased a valuable site on the Escolta for a masonic temple and is contemplating the erection of a five-storey building of reinforced concrete to cost about ₱300,000.

Dr. H. Kneedler is also preparing to build a five-storey office building on his property on Calle Carriedo.

THE TOKYO-YOKOHAMA CANAL.—The *Chugai Shoayo* says that the projected Tokyo-Yokohama Canal may possibly supplement the meager means of transportation. The commercial organ calculates that at present the total tonnage of the cargoes, foreign and domestic that passes between these two places amounted last year to 3,137,297 tons of which 83,830 tons were transported by rail, the rest being transported by sea. Some 1,572 lighters of about 38,667 tons were used in the coasting transportation. Much delay and danger are caused by this meager means of transportation, the average amount of loss from shipwreck being over 200,000 yen a year. According to the plan, as published by the Tokyo-Yokohama Canal Company, the completion of the waterway would shorten the distance from Tokyo to Yokohama by eight miles. Moreover, a trip in the canal would take only one or two days while at present it takes 5 to 7 days from Yokohama to Tokyo, because of waiting for the tide and winds.

NEW RESERVE RESERVOIR FOR MANILA.—Due to leakage through crevices in the country rock at Montalban and the continued drought,

Manila was recently threatened by water famine. The famine was averted but the city engineer is preparing plans for a two billion gallon reserve above the dam to maintain a sufficient quantity always in reserve to supply water for the entire dry season should recent experiences be repeated.

HOTEL AT ILOILO.—The Iloilo Hotel Company has been organized with a capital stock of ₱200,000 for the purpose of constructing a modern 50-room hotel for that city.

SHIPBUILDING, MERCHANT MARINE AND FISHERIES

HAMBURG-AMERICAN LINE.—The report for the year shows that the tonnage of the fleet rose from 1.023,315 to 1,210,717 rt. Therewith 1044 voyages across the ocean were made, covering a total of 8,150,000 miles and conveying 365,393 passengers and 7,286,434 tons of cargo.

The board of directors proposed a dividend of 9 per cent on a capital of 125 million marks. This absorbs 11½ millions of the net earning. More than double that amount is written off on ocean-going steamers and auxiliary vessel. The amount of the gross profits being 40 million marks allow that. At the same time new shares of the nominal value of 25 million marks are to be issued, bringing the capital of the company up to 150 millions.

VULCAN WORKS AMALGAMATION—A resolution was adopted at a recent meeting of the shareholders to the effect

"That it is expedient to effect an amalgamation of this Company with the New Engineering and Shipbuilding Works, Limited, and that with a view thereto this Company be wound up voluntarily and that Godfrey Heathcote Thomson of Shanghai be and he is hereby appointed Liquidator for the purpose of such winding up"

SPEED TRIAL OF THE U. S. A. TRANSPORT MERRITT—The trial took place April 23 at Shanghai and exceeded her contract speed by three-quarters of a knot. The vessel was built by the Shanghai Dock and Engineering Co. and will be utilized as an interisland military transport. A feature of the equipment of the troop deck is the ventilation by sirocco blowers, manufactured by the American Blower Co., electrically driven, by means of which pure cool air is drawn into chambers extending the whole length of the deck and evenly distributed. The hospital built on the awning deck is an excellent piece of work. There are twelve berths, with baths and lavatories, operating room, dispensary, and doctor's office. Arrangements for the food supply are excellent, there being a special cold storage plant, and storage rooms having a capacity of 18,000 cubic feet. The whole vessel is throughout finely fitted and decorated, though, of course, without elaborate ornamentation.

JAPANESE SHIPBUILDING ACTIVITY.—There are ten vessels being constructed in Japan with a view to complying with the Encouragement Law and aggregate 49,500 tons. The Nippon Yusen Kaisha has five vessels building, two at the Mitsuibishi yard of 6,200 and 9,450 tons respectively, and three at the Kawasaki yards of 6,200, 3,500 and 10,500 tons respectively. The Railway Bureau has an order for two 3,000-ton vessels at the Kawasaki; the Marine Association two orders, one of 3,500 tons and another of 2,900 tons at the Kawasaki while the Home Department has placed an order with the Uraga Dockyard for a 1,250 ton dredger to be utilized in dredging the Shimonoseki straits.

MANILA-SAN FRANCISCO LINE—A petition has been submitted to the U. S. Postmaster General by the Manila merchants requesting that a subvention be provided for mail service to encourage the establishment of a bi-weekly service between Manila and San Francisco. The vessels are to make the trip between ports in 15 days.

THE DIESEL ENGINE'S SUCCESS—The success of the motor driven vessel, the Selandia, of the East Asiatic Company, the largest vessel of its kind, is expected to be followed by greater activity in the construction of this class of vessel.

The Selandia is 370 feet in length with a 53 foot beam. It is equipped with two sets of 4-cycle Diesel motors, each with eight cylinders of 20.8x28.7 inches giving an indicated h. p. of 2500 at 140 r. p. m. The use of crude oil for fuel makes a large saving of per h. p. compared with petrol or kerosene.

The Intlandia, a sister ship of the Selandia, is nearing completion at the yard of Barclay, Circle & Co. on the Cylde, and the Fiona at the yards of Burmeister & Wain of Copenhagen, and two additional cargo vessels of larger capacity have been ordered by the East Asiatic Co.

THE SHELL TRANSPORT COMPANY—The Directors of the "Shell" Trading and Transport Company announce that arrangements have been made by which the "Shell" Company have acquired from Messrs. De Rothschild Freres, of Paris, in conjunction with their associates, the Royal Dutch Company, 80 per cent of the share capital in the Société Caspienne et de la Mer Noire and the Société de Mazut. The payment for the shares will be made in shares of the purchasing companies, Messrs. De Rothschild Freres having undertaken not to dispose of the "Shell" shares which they will receive in payment before January, 1914.

P. & O. COMPANY—This company has declared a half yearly dividend of 5% on preference and 7% on deferred shares and will issue 1,160,000 capital shares to form preferred cumulative 4% at 110.

OSAKA SHOSEN EXTENSION—The Osaka Shosen Kaisha (Mercantile Steamship Co.) has decided to issue new debentures amounting to 2,000,000 yen, with a view to the extension of business and the adjustment of loans.

SALE OF OBSOLETE WARSHIPS—The sale has taken place by tender of nine obsolete warships, struck out of the naval list, the sum realized being 425,949 *yen*. The names and prices of the vessels are:—

	Yen.
Takao	65,575
Chinyen	152,387
Hayeyama	61,337
Tenryu	38,500
Iwaki	16,400
Chokai	18,165
Tsukushi	33,000
Hiei	15,615
Akagi	23,000

MITSUBISHI DOCK AND ENGINE WORKS—This company has purchased the patent rights in Japan for Weir's Air pumps and is making arrangements for their local manufacture.

AMUR RIVER TRANSPORTATION—Consul Maynard of Vladivostock reports that the administration of the Amur Railway has decided to puchase and rent a number of river steamers belonging to the Chinese Eastern Railway for transporting railway freight. It is believed that upon the completion of the Amur Railway all the steamers of the Chinese Eastern Railway will be transferred to the former, and the latter will close its navigation department, retaining only sufficient steamers for military purposes.

MOTOR BOAT CONSTRUCTION AT HONGKONG—Two motor boats of 100 h. p. were completed last month in the yards of Messrs. W. S. Bailey & Co. and sailed to Manila under their own power. These boats are 70 feet long with 15 foot beam and have a depth of seven feet. The motors are the Speedway six cylinder type of 100 h. p. using gasoline. They made 10 knots on trial. The vessels will be used by the U. S. military in the Philippines for cable work and are equipped with all the necessary gear.

Among the other orders placed with this firm are one twin screw steel motor house boat for the Asiatic Petroleum Co., two motor boats to the order of James B. Wood of Vancouver, B. C., and six smaller boats.

MINES, MINERALS, THE METAL TRADE, MACHINERY, ETC.

THE HAN YEH PING IRON & COAL COMPANY—At a recent meeting of this company it was decided to increase the capital from $13,160,000 to $30,000,000. The profits for the year amounted to Tls. 6,034,618 compared with Tls. 8,000,000 the previous year. This falling off was due to the revolution. A dividend of 8% was declared.

JAPAN PETROLEUM CO.—This company has ordered modern machinery for its oil well at Nishiyama near Kashiwazaki. This field was purchased from the International Oil Co. An oil well has been dug to the depth of over 1,030 feet and its daily output reaches from 30 to 40 koku (a koku=38.7 gallons). With the completion of various arrangements necessary for the operation of the oil works, the company has started the construction of an oil refinery at Raisatsu in the neighborhood of the oil field with a capacity of 50 koku a day.

NEW SIBERIAN COAL FIELD—An exceptionally rich coal-field has been discovered about 120 versts (120 kilometers) from the Amur river but only about three versts (less than a *ri*) from the line of the Amur railway. The field is thought to be able to yield at least about 60,000,000 poods (about 6,000,000 tons.)

SAGHALIEN PETROLEUM CO.—At a recent meeting it was decided to enter into an agreement with a group of French capitalists headed by M. R. Kalin whereby the latter is to organize a joint-stock company with a capital of not less than 2,000,000 roubles, for the working of the petroleum springs of Saghalien. M. Kahn stated that towards the end of May of the current year there would arrive there a party of capitalists headed by an engineer for the organization of the work in Saghalien, where supplementary surveys would be carried out on the spot. The sum of 500,000 francs has been granted to the expedition.

THE MITSUI MINING CO.—This Company, which is going to open a zinc refinery at Miike next year, as the pioneer of the industry in this country, has now decided to start the manufacture of nitrogen for use as a fertilizer at the Company's coke manufactory at Miike. The coke manufactory at present is engaged only in the production of coke and no arrangements were made for the collection of by-products. Recently, owing to the gradual progress of the working order at the factory, the Company has installed necessary plants for the collection of by-products obtained from the manufacture of coke, such as sulphate of ammonium, pitch, and coal tar, which form the necessary raw material for the manufacture of fertilizer. Besides this arrangements have been completed for the refining of gas obtained from coke manufacture, with a view to supply lights and motive-power for the use of the factory. Of sixty coke kilns at the factory thirty are already turning out the products and the others are soon expected to be in working order.

THE TINGKIE TIN MINES—This new flotation proposes undertaking the development of 1078 acres of land in Johore. The capital of the company is placed at $500,000 of which 40,000 is offered for subscription.

MACHINERY FOR FORMOSA—The *Importers' and Exporters' Journal* of New York says that the Japanese Government has ordered at Chicago, Milwaukee and Lockport, U. S. A., machinery costing $350,000, which is to be installed in Formosa, and will be supplemented by planing and veneer mills. It will be the largest sawmill in Asia. It is proposed that the mill shall be capable of cutting 200,000 feet of lumber daily. The machinery will all be assembled in the United States, and shipped to its destination by Japanese steamship lines.

F. M. S. GOLD, TINAND WOLFRAM.—In 1911, 241.79 ounces of gold were exported from Negri Sembilan and 7,677 ounces from Pahang,

a total of 7,918.79 ounces, writes Vice Consul General Figart of Singapore. The total exports for 1910 amounted to 15,868.5 ounces.

The prospectus has been published of a new tin mining company, capital $114,000 United States currency. Prospecting work in this mine for the past five months has yielded 1640 hundredweight (hundredweight = 112 pounds).

The export of wolfram from Perak in December, 1911, was 57.16 hundredweight, and from Selangor, 346.89 hundredweight. The total exports for the past two years from the Federated Malay States were as follows: From Perak, 1,338 hundredweight in 1910 and 1,582 hundredweight for 1911; from Selangor, 769 hundredweight in 1910 and 2,123 hundredweight in 1911; from Negri Sembilan 49 hundredweight in 1911, none in 1910.

COAL IN THE RUSSIAN PACIFIC.—The most important coal deposits in the Russian Pacific, says the *Mining Journal*, are in Sakhalin Island, mostly on the west side. But the development of the industry is hindered by lack of harbour accommodation. Coal is otherwise rare on the Pacific, except in China. Sakhalin could yield one to three million tons of coal a year. But the actual production is between 33,000 and 50,000 tons a year. Then there are the Suchan coal mines in the Primorsk district, which yield 200,000 tons a year; and the Barabash coal mines in the Amur Gulf. Meantime, the small production of coal in the Russian Pacific areas necessitates the importation of 35,000 to 40,000 tons yearly of Japanese coal, which is of inferior quality.

THE PENHSIHU COAL FIELDS—The Okura Company's enterprises in the Penhsihu district seem to be progressing steadily in spite of the disturbances elsewhere in China. The coal-mine recently interrupted by flooding, has been pumped out, and work resumed. As for the iron-mine which has been discovered at a distance of some 26 miles from the coal deposits, Tokyo journals state that the Okura Company will put up one-half of the projected capital of 2 million *yen*, as the Chinese share-holders are not in a position to furnish any money at present.

BUCYRUS COMPANY TO MANUFACTURE ATLANTIC TYPE SHOVEL—The Bucyrus Company, South Milwaukee, Wis., has taken over the manufacture of the Atlantic type shovel, heretofore built by the American Locomotive Company, New York, and under a license from A. W. Robinson, the patentee, it is the expectation of the company to continue to build all of the sizes previously built, and to eventually have a complete line of Atlantic wire-rope shovels, in addition to a complete line of Bucyrus chain-type shovels. The Bucyrus company has transferred the manufacture of Vulcan shovels from Toledo, Ohio, to the new plant at Evansville, Ind. Norman B. Livermore & Co., San Francisco, Cal., will handle the steam shovel, wrecking cranes, piledrivers and ballast plows of the Bucyrus company in California, and the same products, with the addition of drag line excavators, in Nevada, Utah and Arizona. Arrangements have been made with the Yuba Construction Company, San Francisco, Cal., for the handling of the Bucyrus dredges on the Pacific coast and in Alaska. Smith & Wiggin, Mexico City, Mex., are agents for the Bucyrus company in Mexico. George B. Massey, for a number of years in charge of the New York office of the company, is now at South Milwaukee preparing for an extensive trip abroad in the interest of the company's foreign business. —*Railway Age Gazette.*

GOLD IN THE PRIMORSK DISTRICT.—The production of gold in the Primorsk district (the maritime province of Eastern Siberia) during the year 1911 amounted to about 41,000 ozs.—that is to say, about 13,000 ozs. increase over the preceding year, says the *Mining Journal*. This increase in the production of gold is accounted for by the fresh exploitation of the Ochotsk gold placers, leased to the English company, the Orsk Goldfields, Limited, which is operating on this ground exclusively with dredges driven by electric motors. I admire this company's enterprise; registered in the year 1906, with the object of exploiting certain properties in the province of Orenburg on the frontier dividing Siberia from Europe, it has abandoned fruitless ground and attacked the Pacific first at Kalchan, and then at Ochotsk, in the search for gold.

F. M. S. TIN IN 1911.—The tin mining industry in the Federated Malay States had a prosperous year in 1911, and seems likely to experience a further period of prosperity, judging by the present price of tin and the great absorption of labour into the industry. In 1911, states the Malay States Government Information Office, the export of tin was 44,148 tons, valued at $69,645,466, or £8,125,304. The average local price was $93.90 per per picul, or £184 os. 10d. per ton. In 1910 the average local value was $77.51 per picul, or £155 18s. 4d. per ton £196 10s. per ton in the London market is the present rate.

JAPAN'S MINERAL PRODUCTION—The mineral production in the principal mines of the country during February was 84,607 momme of gold, 2,809,057 momme of silver, 7,474,261 kin of copper, 1,234,535 kamme of iron, 1,326,707 tons of coal, 115,672 koku of petroleum oil, and 4,948,962 kin of sulphur. A comparison with the output of the previous month shows an increase of 5.4% in gold, 3.9% in silver, 9.1% in copper, 7.7% in iron, 13.6% in coal, 2.9% in petroleum oil, and 15.6% in sulphur.

HODEN OIL CO.—At a recent meeting the following accounts were submitted and distribution approved:

	YEN
Net gains	918,634
Balance brought over from the previous term	95,314
Total	1,013,948
To legal reserve	50,000
Depreciation funds	50,000
Dividend to shareholders (12% per annum	757,960
Bonus to officials and employes	50,000
Relief fund	5,000
Balance carried forward	100,988

FINANCIAL, COMMERCIAL AND MISCELLANEOUS NEWS

THE CHINA IMPORT AND EXPORT LUMBER CO.—The report of the directors for the year ended February 29, states that the profit and loss account, including the balance of Tls. 6,253.25 carried forward from last year, shows a credit balance of Tls. 44,643.27, which amount the directors recommended be appropriated as follows. Pay a dividend of 8 per cent. absorbing Tls. 28,520.00; transfer to a reserve fund for equalization of dividends Tls. 10,000.00; and carry forward to new account the balance of Tls. 6.123.27.

YANGTSZE INSURANCE ASSOCIATION—The report of the directors states that the Working Account 1910 and former years shows a credit balance of $253,652.87, against $314.163.90 for working account 1909 and former years on December 31, 1910. The directors recommend the payment of a dividend to shareholders of 20 per cent out of this account, and the transfer of $50,000 to the credit of re-insurance fund and $10,000 to the credit of building reserve fund. The account will then stand as follows:—Dividend of 20 per cent (=$12 per share) 144,000.00; to re-insurance fund $50,000.00 to building reserve fund $10,000.00; balance carried forward $49,652.87.

JAPANESE INDUSTRIAL ACTIVITY—The capital invested in business establishments during the quarter ending March 31 reached 146,040,000 yen, the figures being composed of 91,620,000 yen representing investment in new banks and companies, and 54,420,000 yen in extension of old establishments. Of various organizations, the manufacturing industries head the list with 42,470,000 yen, closely followed by commercial establishments and banking corporations with 36,290,000 and 29,315,000 yen respectively

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JAPAN'S FOREIGN TRADE—The total value of exports and imports during the past quarter has reached 106,070.000 and 165,700,000 yen respectively, the latter showing an excess of 59,630,000 yen over the former. Compared with the corresponding quarter of last year exports show an increase of 7,040,000 yen and imports 20,560,000 yen.

FRANCO-JAPANESE BANK—The negotiations between Japanese and French capitalists looking to the establishment of a bank with head office in Paris and a branch in Tokyo are progressing favorably.

The Bank will be capitalized at 20,000,000 yen (25,000,000 francs), of which 6,000,000 yen are to be taken up by the Société Générale and five other French banks, and the remainder by Japanese co-partners, consisting of the Industrial Bank, Yokohama Specie Bank, Mitsui Bank, Mitsu Bishi Bank, and Baron Shibusawa. One fourth of the total capital will be paid in as the first instalment.

THE GREAT EASTERN ASSURANCE CO.—At the annual meeting of the Great Eastern Life Assurance Co., it was stated that the surplus of the capital over liabilities had increased to $104,000 during 1911. $45,000 had been paid in claims, and the insurances in force amounted to $4,455,170, the premium income being $368,000. The company have an excellent record.

THE EASTERN AND PACIFIC TRADING CO.—This Danish firm, one of the largest copra buyers in the east, has opened an office in Manila.

SHANGHAI GAS COMPANY LD.—The report of the directors for 1911 states that the profit on working account amounted to Tls. 321,455.54 an increase of Tls. 41,489.95 over that for the previous year. The net profit for the year amounted to Tls. 288.012,71, an increase compared with 1910 of Tls. 37,455.64. The balance at credit of profit and loss account, after crediting the account with Tls. 11,116.33 carried forward after the appropriation of profits for 1910, and deducting the sum of Tls. 7,631.58 bonus paid to the foreign staff as authorized at the last annual meeting and Tls. 72,000.00 amount of interim dividend at the rate of 6 per cent paid July 27 last, amounts to Tls. 219,497.46 of which sum the directors remmend appropriation as follows:—Final dividend for 1911 at 7 per cent. (making 13 per cent. for the year) Tls. 84,000; write off depreciation (land and buildings Tls. 4,056.29, manufacturing and distributing plant Tls. 102,016.91, sundry stocks Tls. 15,303.00, furniture Tls. 603.80) total Tls. 122,000.00; and carry forward to new account Tls. 13,497.46. During the year 516,111,900 cubic feet of gas was sold to private consumers, an increase of 11,347,900 cubic feet, or 2.24 per cent. Public lighting accounted for 8,922,900 cubic feet. There were 33,706 tons 12 cwt. of coal carbonized and 435,889 gallons of liquid fuel used in the manufacture of gas.

NEW LUMBERING ENTERPRISE IN THE PHILIPPINES—A concession covering 200,000 acres of timber cords in Mindoro has been secured by Messrs. W. R. Macfarlane and John B. Murphy. The terms of the contract call for the installation of a modern circular saw mill with a capacity of 12,000,000 feet per annum within seven months and of a band saw mill of 42,000,000 feet capacity within a year. This will mean an investment of about ₱1,000,000.

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